NERVOUS EXHAUSTION

DR. CAMPBELL

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AND

THE DISEASES INDUCED BY IT.

WITH OBSERVATIONS ON THE ORIGIN AND NATURE

OF

NERVOUS FORCE.

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PREFACE.

The increase, of late years, of diseases arising from an exhausted state of the great nervous centres, has been remarked by more than one eminent pathologist. By a happy coincidence, the labours of our leading physiologists have been for a considerable time past successfully directed to a searching investigation into the origin and distribution of the various nervous forces, and the special and individual influences they exert over every portion of the animal economy. This fuller knowledge of the intimate relations existing between organic function and nervous supply, has enabled the pathologist to determine the important fact, that many diseases which were formerly considered to depend solely on changes in the organ which manifested the greatest functional disturbance, may be traced to an origin in some portion of the great nervous centres themselves.

The spirit of investigation, which has thus done so much towards furnishing us with an almost complete knowledge of the conditions of the nervous systems in health and disease, has extended to the field of therapeutics also; and the true worth of many important medicines, new and old, more

especially the nervine tonics and sedatives, has been carefully ascertained.

The recognition of electricity as a highly valuable remedial agent has also materially strengthened and enriched the means of relief and cure now placed at the disposal of the physician, while it has, in addition, furnished him with an unerring means of diagnosis in many nervous diseases hitherto most obscure.

Taking all these facts into consideration, we can now say, that at length the origin of many obscure nervous diseases has been clearly ascertained, and the remedies best calculated to remove the morbid influence fully determined and understood; thus placing the physician in a position to treat with confidence, and full hope of a happy issue, diseases hitherto almost without the pale of curative medicine, but which may now be esteemed curable at any point short of actual structural degeneration.

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NERVOUS EXHAUSTION.

CHAPTER I.

THE INFLUENCE OF CIVILIZATION IN THE PRODUCTION OF NERVOUS DISEASE.

Nervous exhaustion, the basis of so many important functional diseases of the most dissimilar character, is essentially the disease of civilization. The more advanced a nation has become in the means and desire for enjoyment of the senses, the more prevalent have nervous diseases been amongst its people; and when to these have been added the effects of the vices of large and crowded cities, and the neglect of hygienic laws, a condition of constitution has been produced in which proneness to severe nervous affections is one of the most prominent as well as most serious symptoms.

Diseases depending on an exhausted state of the great nervous centres may be divided into two classes—viz., the induced and the hereditary. The induced include all those cases of severe functional derangement which have their origin in some error of the individual; the hereditary, those in which the offspring suffer for the faults of the parent.

Impoverishment of brain and nerve-tissue is produced by many causes not vicious in themselves. Of these may be noted severe mental strain, from the anxieties of a public career or of an extensive business, or the cares, risks, and burdens of a large and expensive family. The individual whose whole time and attention are given to the constant and anxious watchings of the rapid fluctuations in the values of the commodities on which his chances of profit or loss depend; the responsible manager of extensive commercial, engineering, financial, and other operations involving much mental labour as well as risk; the successful and overworked professional man—all are liable to that slow process of wear and tear of their nerve substance, which, while it is less perceptible in its immediate effects than sudden shock, is far more serious in its ultimate results. In the female also there are many causes, depending on sex, which induce nervous disease. Of these, too frequent child-bearing and excessive nursing are not the least frequent or important.

Of a more reprehensible origin than the causes just enumerated are those cases of profound and distressing nervous exhaustion brought on by the vices of civilization. The inordinate use of stimulants, of opium, of tobacco; the abuse of the sexual powers, especially by unnatural excitation; and the habits of general and reckless dissipation, which debase the mind while they prostrate the physical powers and inoculate the blood with the poisons of syphilis, mercury, &c., are amongst the principal factors of this class. The dulness and coarseness

of the original tissues of some individuals may save them for a time from the effects of these vices, but only for a time, as sooner or later they must bow to the inevitable law, the principles of which they have so systematically sinned against.

The foregoing remarks will tend to show the many difficulties which in an artificial state of society are in the way when we look for the preservation of a healthy and vigorous state of constitution in the masses. It seems impossible almost to preserve a family for many generations from some exhausting cause, although that cause need not necessarily be of a vicious character, nor one for which the offspring have reason to reflect on the progenitor. On the contrary, the affluence and social position of the individual may, as well as the nervous temperament, be the direct consequence of the severe mental labour of the ancestor.

CHAPTER II.

THE NERVOUS CONSTITUTION—HEREDITARY AND ACQUIRED.

The nervous constitution, like other conditions depending on transmission from a parent stock, has a tendency to pass over individual members of a family, and even occasionally skip a whole generation; and when it does manifest itself, it is often displayed in a very different form from that which declared itself in the original. Thus, of half-a-dozen descendants of a nervous, dyspeptic ancestor, one may have a neuralgia of a most severe and intractable character, or die suddenly from an attack of angina pectoris; a second may be hypochondriacal, or a martyr to melancholia; a third may be afflicted with spinal irritation or chorea; a fourth with epilepsy; a fifth with hysteria; a sixth with spasmodic asthma; and while some escape altogether, others may have certain eccentricities of character which may remain as such or eventually culminate in mental aberration.

The hereditary nervous constitution is not necessarily subject to disease, but rather prone to it. It is liable from the very commencement of life to derangements of nervous action, and is at all times more susceptible to the influences of those condi-

tions which produce such derangements than other forms of constitution. In infancy there is a liability to convulsions, in childhood to chorea, at puberty to those functional derangements which depend on the too rapid evolution of the sexual system, giving rise to chlorosis and menstrual irregularities in the female, and exhausting spermatic discharges in the male. As life advances we trace the same temperament in the neuralgias, sick headaches, attacks of angina pectoris (heart-pang), dyspepsias, hysterical attacks, profound melancholies, and all the obscure and anomalous ailments comprehended in the term nervous.

Many of these peculiarities may remain latent in the individual until some unforeseen circumstance calls them suddenly into existence, when they show themselves with an intensity and a persistency in direct proportion to the extent of the hereditary tendency. The causes which induce nervous exhaustion in the previously robust constitution act with more rapidity and force on those constitutionally predisposed; hence excesses which would leave but trifling effects *at first* on the non-nervous temperament would have an almost fatal influence over the nervous.

As a counterpoise to these susceptibilities, there is, in the nervous constitution, a comparative immunity from febrile and inflammatory diseases, and the average of life is not below the standard; and although to many existence itself may be almost insupportable, to others, and happily the greater number, it carries its fair share of enjoyment.

This refers only to the hereditary nervous constitution: where nervous exhaustion is induced by the habits or pursuits of the individual, a very different condition exists, and one which will be more fully understood as we proceed.

The brain and nervous system bear a somewhat close resemblance to a galvanic battery in constant action, whose duty it is to provide a certain and continuous supply of its special fluid for consumption within a given time. As long as supply and demand are fairly balanced, the functions which owe their regular and correct working to the fluid are carried on with precision, but when by fitful and excessive demands carried far beyond the means of supply, the balance is not only lost, but the machine itself is overstrained and injured, disorder first and disease afterwards are the result.* This view, which is now very generally accepted by the physiologist, illustrates pretty clearly the condition of a healthy and well-balanced brain and nervous system, supplying without an effort all the nervous force required in the operations of the mind and body so long as its work is in proportion to its powers, but soon embarrassed by excessive demands, and feebly and fitfully endeavouring to carry on the mental and physical operations over which it formerly presided without an effort.

In addition to the brain and spinal nerves, the great sympathetic system is also materially influenced and injured by over-demand; and as inebriety,

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* Herschel.

gluttony, venereal excess, and all the other vices of a physical origin operate primarily on organs supplied by this system of nerves, and as this system follows the same law as the others, by which the more it is unnaturally stimulated the more its powers decay,* it is easy to understand, bearing in view the intimate relations existing between it and the cerebro-spinal nerves, how indulgence in these vices will induce severe exhaustion, not only in the nerves primarily affected, but in those also affected in a secondary degree.

One peculiarity of the nervous constitution is specially worthy of notice, as it accounts for the many anomalous sensations of distress, discomfort, &c., which frequently afflict the individual without any apparent reason, as well as for those vague feelings of alarm at some unknown but impending danger, and that excessive depression of spirits and melancholy which torment the nervous sufferer—viz., great susceptibility to atmospheric changes, especially such as involve much electrical disturbance.

The fact of two daily tides of positive electricity occurring in the atmosphere is now fully established and recognised. These tides are at the greatest height between the hours of nine and twelve in the morning, and six and nine in the evening; while the lowest points reached in the electric flow are between two and five P.M. and one and five A.M.† The presence of this positive electricity has a sustaining and

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* Proctor. † Wislicenus.

exhilarating effect on the nervous, and it is well known they can employ their mental faculties with more clearness and precision, and with less effort, during the periods of high positive electric tides—the morning and early evening—while at the other periods there is a sensible declension of mental and bodily power.

Negative electric currents, on the other hand, have a depressing and exhausting effect on the nervous; and this is evidenced in the unpleasant sensations felt by them before a thunderstorm, when negative electricity abounds.

As there are daily tides of positive electricity, so are there also seasons. Autumn and winter are the periods when it is in the largest volume in the atmosphere, and these are the times when it is usual for the neurasthenic to enjoy the best health and spirits; while in the late spring and summer, when the opposite condition of atmosphere prevails, they are usually at the lowest point of health and spirits.

These conditions of nervous exhaustion are due, no doubt, to certain changes produced in the natural state of the microscopic molecules of which the nerve substance is composed, whereby their healthy balance is lost and the proper generation of nerve and muscle currents interfered with. This state of disarrangement is termed molecular perturbation, and in proof of the correctness of the theory just advanced, it can be shown that artificial induction of these perturbations gives rise to all the symptoms of nervous exhaustion, only limited in

the amount of prostration by the extent of the disturbance; and if continued for any time sets up all the symptoms of hysteria, dyspepsia, hypochondriasis, chlorosis, &c.* Now these symptoms are entirely due to these artificially-induced perturbations, and are totally distinct from the true dynamic reactions which, in the healthy molecular condition of the nerves, are produced in them by the ordinary exigences of existence.

In nervous exhaustion from hereditary predisposition, the primary factor is mal-nutrition, from a special inherent tendency in the elementary parts of the tissues to become altered in one way or another, so that the healthy currents are not generated as fully or with the full *tension* of health. This inherited defect may not exist in all portions of the nerve tissues, but may and frequently does localize itself in one particular part—it may be in some part of the cerebro-spinal system, or confined to the sympathetic, and in either case it will manifest its presence by giving rise to functional disorders in those parts only of the body which derive their nervous supply from that particular centre.

In nervous exhaustion from excessive use and abuse of nerve force, the molecular disturbances are very considerable, and as a consequence the nerve currents are weak and insufficient; while the interdependence of forces in the animal economy is so great that the loss of balance rapidly leads to insufficient nutrition, with morbid changes of chemical

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* *Vide* "The Experiments of Du Bois-Reymond."

structure, which if long continued usually ends in degeneration of tissue.

Whether the nervous constitution be hereditary or induced, one thing is certain to the individual—that anything which interferes with the natural direction of the currents from any of the great nerve centres produces severe functional derangement. This is well exemplified by the experiments of Dr. Ranke of Munich, who found that interference with the natural direction of the current in the spinal cord of animals made them suffer from a morbid increase of reflex excitability, and brought on a most wretched and miserable state of health, while by restoring the natural direction, through the agency of mild galvanic currents, the animals were restored to health, and all the reflex excitability removed.*

Now this condition in animals, which Ranke produced by reversing the natural current of the spinal cord, is strictly analogous to those states of the human sufferer to which the convenient name of nervous dyspepsia is given, but in which derangement of digestion is often very secondary to other more distressing symptoms; and had the great sympathetic system of nerves been subjected to the same treatment as the spinal cord in these animals they would have experienced all the long train of miseries which we sum up under the name of hypochondriasis, if their intelligence had been sufficient to enable them to appreciate their sensations,

* "Zeitschrift für Biologie," 1867, vol. ii. p. 398.

and their abilities been equal to the task of describing them.

Hypochondriasis is, in fact, the result of disturbance of the spinal and sympathetic systems acting on a high degree of cerebral development, and if not removed, liable to pass on to degeneration of tissue.*

A considerable amount of muscular development occasionally exists in conjunction with a highly excitable and easily exhausted nervous system. This is more frequently the case in the inherited nervous temperament, which might be expected, as the acquired nervous constitution is produced by direct violation of all the laws of hygiene, which act as powerfully on the muscular as on the nervous tissues.

It is not uncommon to find the son or grandson of a successful merchant or professional man living on the estate which his ancestor's labour has acquired for him, fulfilling all the duties of a country gentleman, with ample means, in perfect health and spirits, with capital muscular development, and great powers of endurance, equal to all the labour of his station, a keen sportsman, with good appetite, good digestion, easy temper, and no cares or harass, suddenly, without any recognisable cause, evince all the symptoms of the nervous diathesis. An undefined feeling of wretchedness will seize him, he will experience all the misery of

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* Gull, in Reynolds' "System of Medicine," Article *Hypochondriasis.*

a man overburdened with care, and live in a state of perpetual alarm of some unknown danger which is about to fall on himself or those he holds dearest; and yet with all this his mental balance is unimpaired; and if you reason with him you will see he appreciates, as fully as you do, the absence of all external cause for his mental misery and distress.

Instead of these diffused feelings of wretchedness, the nervous exhaustion may manifest itself by discomfort or derangement of function in some important organ or class of organs. Either of these conditions may become permanent unless removed by treatment, or, what is not unlikely, disappear as suddenly and unaccountably as they came, to reappear in the same manner at some uncertain period in the future.

It is quite clear, in such cases as these, there is a latent flaw which, although inherited, has been kept under, until perhaps the middle period of life, by a healthy open-air existence.

Sufferers of this class will generally attribute the first seizure to some unimportant cause—some circumstance so trifling that they will tell you it was passed over at the moment without thought, and only recalled to remembrance by the process of tracing back for a reasonable cause of the malady.

A frequent and serious cause of functional nervous affections must not be overlooked here—viz., morbid states of the blood. These are capable of producing all forms of nervous disorder; and as want of nutrition, as already shown, is a fertile source of nervous exhaustion, we can have no diffi-

culty in understanding how severe loss of blood is itself likely to produce nervous diseases. This latter cause was first pointed out by Dr. Marshall Hall;* and since then various authors have followed in the same direction.

Paralysis, neuralgia, insanity, chorea, epilepsy, catalepsy, and all convulsive disorders have been pointed out by an eminent French pathologist to be frequently produced by anæmia, whether due to loss of blood or other causes;† which simply means that nutrition of nerve-tissue being defective, any kind of nervous disease may declare itself. The poison of gout has a most pernicious effect on the nervous centres, and the most fatal forms of nervous disease may arise from the presence of urea in the blood, the result of kidney disease.

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* *Vide* "Essay on the Hydrocephaloid Disease in Children."

† "Recherches sur les Causes, etc. des Maladies Nerveuses," par O. Landry, M.D. Paris.

CHAPTER III.

THE GREAT NERVOUS CENTRES AND THEIR DEPENDENCIES.

THERE are two great systems from which nerve force is derived in the animal economy. One system is termed the cerebro-spinal, as it takes its origin from certain material located in the brain (cerebrum and cerebellum) and spinal cord; the other is termed the ganglionic, from the manner in which it originates, and the great sympathetic, from the functions it performs.

The cerebro-spinal nerves preside over all the acts of animal life. They are the nerves of relation, and while their central extremities or origins are lodged in some part of the brain or spinal cord, their terminations are distributed in the various tissues of the body, and follow one fundamental law —that their filaments are continuous from their origin to the extremity of their distribution, and that their continuity is never broken. They frequently join other nerves, and enter into various combinations, but the continuity of structure is never interrupted.

The sympathetic system of nerves, or ganglionic, presides over nutrition and all the functions of organic life. It is most distinctly a system *per se* receiving certainly contributions from both brain

and spinal marrow, but still operating in a manner peculiarly its own, having its own special duties to perform in the body, and by its influence modifying even the sensory and motor nerves of the cerebro-spinal system the moment they become associated with it. As Sir C. Bell forcibly remarks:—"The sympathetic is for those thousand secret operations of a living body which may be called constitutional. Circulation, secretion, and absorption are operations which simultaneously affect the whole frame."

The formation of the great sympathetic system of nerves marks not only its importance in the animal economy, but also the manner in which its intimate relations with the cerebro-spinal system is produced and maintained. It takes its origin from the spinal cord in its entire length, and consists of a series of ganglia connected with one another in their action, and originating from each of the spinal nerves. Each ganglion is connected with both motor and sensory nerves as well as with the "nerves of Remak," which are, in fact, its own special and essential nerves; and this same combination of motor and sensory nerves from the spinal cord with the sympathetic nerve proper, obtains in all the plexuses formed by the sympathetic system, and an interchange of fibres takes place between each pair of ganglia in the main cords of the sympathetic and the corresponding spinal nerves.*

The structure of the ganglia, and the manner in which the fibres of the sympathetic nerves proper originate in them, are well worthy of a few mo-

* *Vide* Meryon on "The Functions of the Sympathetic System." 1872.

ments' consideration, as they are very pregnant with suggestions relative to the manner in which molecular perturbations may arise, and originate functional disorder or disease in so many and to all appearances so widely different organs, while they also guide us to the method by which the perturbations may be overcome, and the healthy balance on which organic functions depend, restored.

Each ganglion is, in fact, within its own sphere as much a nervous centre as the brain or spinal cord, and (limited by its functions) quite as capable of receiving, transmitting, originating and reflecting the impressions requisite for the due fulfilment of healthy function by the organ over which they preside.

Each ganglion consists of an aggregation of cellular and fibriform substances. The cells are composed of granular matter, and near their bases contain a large rounded nucleus, within which is a nucleolus; in the centre of each cell the granular matter gradually assumes the form of a nerve fibre, which is continued outwards, in the form of a straight fibre. At the circumference of the cell the granular matter also assumes the form of a nerve fibre, and, projecting outwards, winds round the straight fibre in a spiral manner. These spiral fibres, after having surrounded the straight fibres, are continued in a direction parallel with them for a short distance, but eventually turn and take a course diametrically opposite to that taken by the straight fibres.*

* Beale.

Both sets of fibres, straight and spiral, spring from the granular matter which composes the body of the cell, and each cell is the starting-point of one or more nerve fibres, according to the number of nuclei with their nucleoli which it may contain.*

Nerve cells are always connected with nerve fibres, and every form of nerve fibre in a ganglion is connected and continuous with the cells of the ganglion.†

The fibres of these nerves are partly pale and partly dark-edged, and their peripheral extremities are distributed over the walls and in the coats of all vessels but the capillaries.‡ In their course they cling to the arteries, and often entirely surround them, watching, as it were, every branch that is given off in order to furnish one also, entering into its coats in every direction,§ and ramifying with it into its minutest distributions.

From the close connexion already pointed out between the spinal cord, each nerve of which gives off communicating branches, and the special ganglionic nerves, it can be easily understood that the great organs of organic life which receive their nerves from the sympathetic system derive their principle of action from the whole spinal cord, modified by sympathetic influence; so that an affection of one nerve or one visceral ganglion must affect the whole ganglionic system in consequence of this intimate relation,‖ and also the brain and spinal

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* Stricker. † Schultz. ‡ Tyson. § Proctor.

‖ This accounts for all the anomalous symptoms and sensations experienced in hypochondriasis, which is essentially a disease of the sympathetic system.

cord from the connexion of the pneumogastric and spinal nerves.

The sympathetic and the division of the spinal ganglia called the splanchnic, with the pneumogastric nerve of the right side, form together one vast plexus of nerves, the solar, which branching out from a centre like the rays of the sun, connects in an intimate manner the several viscera with each other, and with the rest of the body. The solar plexus is, in fact, the great nervous centre of nutritive life, and is to it what the brain is to the higher faculty of thought. This mutual dependence and sympathy is the chief characteristic of the organs of nutritive life.*

To arrive at a full appreciation of the immense influence exercised over all organic life by the great sympathetic system of nerves, we must, in addition to the foregoing, take into account that they stand in most intimate relation to the secreting cells of all glands,† and that a large proportion of the muscular apparatus which directly administers to organic functions—viz., that which surrounds the alimentary canal from the stomach down to the anus, the walls of the bladder and uterus, the ureters and the Fallopian tubes, and that which governs the diameter of the vessels, receives no other nerve supply, and also that in the embryo the heart, which is supplied by it, is in existence before the brain and spinal marrow.

The importance of the sympathetic system of

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* Cruveilhier. † Pflüger.

nerves in directing, conducting, and controlling all the most important and essential acts of organic life, and at the same time keeping up an interchange of sympathies between the various and most dissimilar organs, cannot be too highly estimated. We have seen that its close relationship to the spinal nerves as they issue from the cord, and with some of the most important cerebral nerves, places it so thoroughly *en rapport* with all the great operations of mind and body, that it fully justifies the name sympathetic. We can thus understand how emotions of the mind affect the various viscera, and derangements of the viscera influence the brain and mental faculties. Into this subject we shall enter more fully when we come to discuss some of the forms in which nervous exhaustion manifests itself.

Messrs. Vulpian and Philipeaux have proved by their experiments that all nerve fibres are mere conductors, able to transmit nervous force either towards or from the nervous centres; and that the same nerve *fibre* may serve for sensation or motion when transplanted from one nerve trunk to another;* and Dr. Brown-Séquard has demonstrated most fully and clearly that "the nervous conductors serving to the following functions—the transmission of the various kinds of sensitive impressions, the reflex phenomena, the conveyance of nervous force to muscles or to blood-vessels, &c. are absolutely distinct one from the other as regards their function;" "for the function of nerve fibre depends,

* *Vide* "Journal de Physiologie de l'Homme," &c., vol. vi.

not on peculiar or specific properties of their own, but on the properties and functions of the organs into which they are distributed and the parts of the nervous centres from which they spring." Not taking into account the nerve fibres of the brain itself, whose functions are totally different from those of other parts of the nervous system, this eminent physiologist has ascertained eleven distinct kinds of nerve fibres in the spinal cord and in the cranial, spinal, and sympathetic nerves, and this without reckoning the four distinct nerve fibres of the higher senses—hearing, seeing, tasting, smelling. Moreover, he has been able to trace these eleven different kinds of nerve fibres into the spinal cord, where they still retain their distinctive characters, and form groups or columns of conductors; and he affirms that the number of functionally distinct nerve fibres is probably much greater, although not yet sufficiently demonstrable to be assumed as an ascertained fact.*

Now almost all the symptoms of functional and even of organic changes which produce nervous affections take place through one or other of three modes of alteration of the properties and functions of these fifteen sets of nerves or conductors of nerve force. These three modes are—

1. Diminution or loss of power.
2. Increase of power.
3. A perverted or morbid state, producing a great variety of phenomena.

* *Vide* "Functional Nervous Affections," by C. E. Brown-Séquard, M.D., F.R.S., &c., Part I.

With the first and last of these modes it is our special province to deal later; but in the present connexion it is of importance to note as an illustration of the effects produced on different individuals by the same cause, that irritation of a part acting on the same nerve of conduction from that part to the same nervous centre may, as pointed out by Dr. Brown-Séquard, produce the greatest variety of effects, including every functional nervous disorder. For example, a number of persons leave a hot and crowded assembly together, and plunge into the night air, exposing some small portion only of the neck and chest: one will have sore throat, a second inflammation of the eyes, a third inflammation of the chest, a fourth inflammation of the bowels, a fifth inflammation of the kidneys or bladder, and many others some functional disturbance of a severe or mild character.

This special power of the individual who receives the impression, to mould it as it were to his own peculiarities of constitution, is further illustrated by what I have already remarked in the varieties of symptoms manifested in the descendants of a neurasthenic ancestor.*

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* *Vide* page 4.

CHAPTER IV.

ORIGIN AND NATURE OF NERVOUS FORCE.

What is this force which produces all the effects we have glanced at, and, as already shown, is transmitted from certain centres to all parts of the organism—which controls its nutrition in its mere organic system, and directs all the acts and functions of its higher animal life?

How is this force generated? The discussion of these questions and the formation of a just conclusion are of vital importance in any efforts to treat diseases arising from waste and exhaustion of nerve force.

There is now no question in physiology more definitely settled than that nerve force is as certainly a substance, and as clearly demonstrable to the senses as light, heat, electricity, or any other imponderable body; but whether it and they are all distinct elementary fluids, or merely results of certain arbitrary variations in the molecular arrangements of one primitive form of matter, it is not within my province to discuss here. For the questions before us it is enough to state that nervous force, as such, has its distinct existence, and is governed both as to its production and waste by certain fundamental laws.

According to the experiments of Helmholtz and Schleske with the chronograph, the velocity of nervous force in man is 97·5 feet in a second. By the employment of a different instrument it has been ascertained that the brain is $\frac{1}{26}$th of a second in recognising an impression, and $\frac{1}{28}$th of a second in telegraphing back that the impression has been received; it occupies the $\frac{1}{20}$th of a second for the brain to distinguish and *signal* the difference between any two colours presented to the eye, and about the same time to distinguish between two vowels as they are spoken; forcibly illustrating the rapidity of mental perception, and the method in which the operations of brain and nerve are conducted.

To give a familiar example of how this nerve force acts. A man accidentally places his hand on a hot iron, and instantly, as he fancies, withdraws it; but what really occurs in that mere "flash" of time? The story has to be carried to the seat of intelligence, the brain, before the hand can be removed; having received through the sensory nerves a report of the occurrence, it telegraphs by the motor nerves to the muscles of the limb to remove it from the cause of pain, and it is done accordingly; so what seems at first sight a simple and instantaneous act is in fact a complex proceeding, occupying in the message and response about the thirteenth part of a second of time; and infinitesimal as this period actually is it embraces within it four distinct and essential acts: 1st, the message to the brain; 2nd, its recognition by that organ; 3rd, the message back along a different set of

nerves to the muscles of the limb; 4th, the muscular action itself. This reflex action, as this process is called, is intimately employed in almost all the physical acts which we perform of which the mind takes cognizance. Thus all the evacuations of the body over which we exercise control involve in their performance a reflex action; a sensation of discomfort in the bladder or intestines is carried by the sensory nerves to the centre of intelligence, from which a message is sent to certain muscles to remove the cause by pressing it out of the bladder or bowel, as the case may be, and it is done accordingly.

Now the conditions which are required to produce these and other acts, mental and physical, are to be found, as we all know, in the nervous systems.

The existence of certain currents of subtle fluids, in the nerves and muscles of the animal body was demonstrated as far back as 1786 by Galvani, but from the doubts thrown on his experiment by Volta and others, notwithstanding the powerful advocacy of Humboldt and Aldini, the discovery was allowed to pass into obscurity, and remained unnoticed until 1828, when Nobili published his discovery of an electric current in the frog. This aroused the spirit of scientific investigation, and twelve years later Matteucci made known the result of his labours in this direction and was followed later by Du Bois-Reymond,* whose laborious and trustworthy experiments have proved, to the satisfaction of the

* "Untersuchungen über thierische Elektricität." Berlin, 1853.

scientific world, the presence at all times during life, of electrical currents in the brain, spinal cord, and other nerve centres; in sensory, motor, and mixed nerves; in the minutest fragment as well as in the largest mass. This he proved in the bodies of man, rabbits, guinea-pigs, mice, pigeons, sparrows, tortoises, lizards, frogs, adders, glow-worms, toads, tadpoles, salamanders, tench, fresh-water crabs, earthworms—in fact, in creatures chosen from all parts of the animal kingdom.

The identity of these currents with electricity has been proved by the fact, that with them fluids, such as the iodide of potassium in solution, have been decomposed, and movements produced in the needle of the galvanometer, while their quantity, strength, direction, &c. have been carefully ascertained. Now, although this animal electricity is not life, it may be safely reckoned as its lieutenant: it is the power with which the operations of the vital forces are performed, and without which all the operations of the animal economy, from the nutrition of the meanest creature to the intellectual triumphs of the highest order of genius in man would be arrested. The importance of this discovery can scarcely be exaggerated: it is the master-key which unlocks the door and lets in the light on many mysteries in which lay important truths heretofore in darkness. Its influence on curative medicine is being felt in its determining with accuracy the causation of disease and indicating the correct principles on which remedial means must be employed.

The minute structure of brain and nerve-tissue consists of longitudinal tubes, containing within them innumerable microscopically minute molecules which are the true nerve substance. These molecules are endowed with electrical qualities and vary in their arrangement according to the condition of the nerve. These changes are indicated by sudden variations in the strength and direction of the current.

According to the theory of Du Bois-Reymond, founded on the experiments already alluded to, these molecules of living nerve (and muscle also) are electrified negatively at the two poles turned towards the two ends of the fibres, and positively in the interpolar portion turned towards the sides of the fibres, or else the reverse. According to this view, the ends of the fibres are negative, because the negative poles of the peripolar molecules are turned in this direction; and the sides positive, because the positive interpolar belts of the molecules are so turned; or else the ends of the fibres are positive, because the poles of the peripolar molecules, pointed towards the ends, are positive; and the sides negative, because the interpolar portion of the molecules pointed in this direction are in this case negative. According to this view the nerve current and muscle current are derived portions of infinitely stronger currents ever circulating in closed circuits around the peripolar molecules.

This theory of Du Bois-Reymond of the constant flow of the current in closed circuits around the peripolar molecules is the one generally accepted,

although opposed to the views of a recent distinguished inquirer in the same field.* But whether the electric condition be current or static, it does not affect the universally acknowledged fact that the force is there, and by it all the great and small operations of life are carried on.

How is this current generated? This subject has not been dealt with as fully or satisfactorily as the other; investigators seeming to be more occupied with proving the existence of the current, its force, and direction, than its mode of generation, although it appears to me the latter question is of extreme importance; from a curative point of view it certainly is, as it cannot admit of question that if the currents themselves are the essentials of animal existence, a knowledge of their mode of generation is of the highest value, as upon their correct and sufficient production health and life depend. Much doubt and difficulty have heretofore been associated with this investigation; the subject, however, admits of an easy, clear, and natural explanation. The generation of electric currents in the animal body can be shown to be a natural and inevitable consequence of the processes of *nutrition and detrition.*

In assimilation or nutrition, the nutrient material containing many different elements prepared from the food by the process of digestion, and carried through the circulation, in the form of blood, to the minute structures which it is intended to repair and

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* *Vide* "Dynamics of Nerves and Muscles," by C. B. Radcliffe, M.D. Macmillan, 1871.

renew, bears within itself, as almost everything in nature does, natural or latent electricity; this is given off at the moment of assimilation, and as it is a compound substance consisting of two distinct varieties, named positive and negative, it is decomposed, the negative force going to the poles of the nerve molecule, while the positive attaches itself to the equatorial zone; these again combine as the occasion requires, forming free electricity, which always flowing in one direction becomes the true nerve currents. The same condition is taking place in the muscles and other structures of the animal body, but these are not within the scope of the present observations.

It will be seen from the above that nerve force is the result of nutrition, and that its generation depends not only on the circulation but the quality of the blood; hence whatever impoverishes that fluid, or deprives it of any of its essential elements, deteriorates the material from which the supply of nerve force is drawn and reduces the power and quality—the tension and volume, in fact—of the currents. Now as nutrition, however perfect, cannot be carried beyond a certain point, the supply of nerve force must have a certain limit, and if more demand is made on brain and nerve than they are calculated to meet, the strength and quality of the forces must eventually suffer; and as the process of nutrition itself is directed and assisted by the very force it calls into existence, that essential process is itself materially injured and rendered less able to furnish the required supply, so that the whole

travels round in a vicious circle. Thus, the nerve and brain currents are the result of the nutritive processes going on in nerve and brain tissue; these same currents in their turn preside over the nutritive processes. Excessive demand on these currents withdraws the vital stimulus to nutrition and impairs the powers of the process, so that it goes on feebly or imperfectly, while a feeble or imperfect nutrition yields only a feeble or imperfect current. It is important that these points should be clearly understood, as without a due appreciation of them it is impossible to fully understand, not only the causes of nervous exhaustion, but the true principles on which treatment should be based.

To sum up: four factors go to the production and mainteuance of that healthy condition of brain and nerve tissues on which their functional activity depends, viz.:—

1. A proper supply of the elements which nourish and support them.
2. Perfect assimilation of these elements, and consequently perfect nutrition.
3. Correct arrangement of the molecular structure, and, as a consequence of the others,
4. The presence of a due amount of electricity.

As these conditions have a mutual dependence on each other, their perfect balance is requisite for the geueration and conduction of a full measure of brain and nerve force.

We know that the intelligence of men and animals is proportioned to the quantity and quality of the cerebral contents; that the proportions of

water, phosphorus, fat, and the other solid constituents of the central nervous system vary more or less with the age and with the intellectual and moral capacity; and from these established facts we logically conclude that the slightest and most transient disturbances of the nervous system are the symptoms and expressions of correspondingly slight morbid changes of the brain or spinal cord, or sympathetic, or of the peripheral nerves. Microscopical and chemical examinations of persons who die in a neurasthenic condition substantially confirm these views.*

The foregoing observations on nervous force, its mode of generation, its power, attributes, and diffusion through the minutest structures of the body, point most forcibly to an identity with electricity. This view has been opposed by some observers, who base their objection on the grounds of the different rate of speed between nervous force and electricity; but this plea falls to the ground when it is shown that the tissues of which a nerve is composed are, more properly speaking, non-conductors than conductors, and that supposing the fluids to be identical, the rapidity of transmission is governed by the conductibility of the medium. Thus the resistance of one inch of the sciatic nerve of a frog to an electric current of a given strength was found by Dr. Radcliffe, in his investigations with Sir William Thompson's new quadrant electrometer, to be eight times that of the whole Atlantic cable.

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* *Vide* Beard and Rockwell, page 298.

I cannot better close these remarks on nervous force than in the words, as brilliant as they are profound, of the same accomplished physiologist:—"What is called electricity is only a one-sided aspect of a law which, when fully revealed, will be found to rule over organic as well as over inorganic nature—a law to the existence of which the instincts of philosophy and the discoveries of science alike bear testimony—a law which does not entomb life in matter, but which transfigures matter with a life which when traced to its source will prove only to be the effluence of the Divine life."*

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* Op. cit.

CHAPTER V.

GENERAL PRINCIPLES OF TREATMENT.

As nervous exhaustion is essentially the result of impoverishment of brain and nerve tissue, the disease, when not taking on any distinct set of local symptoms, must be treated on the broad principle of improvement of general nutrition. Indeed, even where attention to local symptoms is imperatively called for, the fact that general nutrition of the whole nerve system is of paramount importance must be steadily kept in view, for until the defective elements are restored to their natural balance, and the molecular and other conditions necessary for healthy performance of function duly established, no permanent benefit will accrue.

In the great nervous centres and in the nerves themselves there must be at all times a fair balance between work and nourishment; where this balance has been lost its restoration can be brought about only by concentrating on the faulty tissues all the nutrient and tonic influences which can affect them beneficially. These influences are not to be confined to food and medicine alone; they must embrace the wide field of hygiene, and include all the benefits which can be obtained from cheerful change, exercise without fatigue, air, light, pleasing

society, diversion of mind, and rest from harassing work or duty.

Mild muscular exertion, sea-bathing when obtainable, gentle horse-exercise, and all the amusements and occupations comprehended in a holiday. To these must be added the internal remedies which the symptoms indicate and which experience of similar cases leads us to hope will be of material benefit in improving the quality of the blood, and through it restoring the healthy condition of the nerve-tissues.

The functional nervous affections depending on morbid conditions of the blood, or the presence of poisons in it, must be dealt with in the first instance in the same manner as the diseases already noticed, but in addition attention must be given to the removal of the particular poison or morbid condition present. Rheumatism, gout, diphtheria, scarlatina, syphilis, malaria, lead, mercury, &c. &c., are all exciting causes which must all be dealt with and eliminated in the usual way, while attention is being given to the nutrition of the diseased nervous centres.

In the faulty states of blood, as anæmia, chlorosis, &c., food is often preferable to physic, and it is a matter of congratulation to find that the immense value of hygienic means to improve the condition of the blood and through it of the great organic functions, is beginning to be as well understood by the body of the profession as it long has been by the distinguished chiefs of it.

The value, however, of the usual remedial agents

must not be overlooked in dealing with these conditions; that mode of treatment which aims at furnishing to the blood substances in which there is deficiency in quantity, either in the fluid itself or in the nerve tissues, will not usually be attended with success. The power of assimilation being impaired, efforts must be directed to its restoration and to the direct improvement in the nutrition of the nervous centres.

The selection of remedies, therefore, must be quite independent of the idea of chemical supply, and must be guided by the principle of improved nutrition.

Mineral poisons which have produced functional derangement of nerves—such as lead and mercury—must be eliminated from the system. This must be done by careful employment of iodide of potass, which will not fail in judicious hands to quickly effect this object.*

As regards the poison of syphilis, it is most essential to destroy it, so many of the gravest nervous diseases depending on its presence; here also, iodide of potass may be employed with every prospect of success, and the practitioner must measure the dose by its effects, and not scruple to prescribe it freely.

In dealing with the children of neurasthenic parents, in whom it will be most desirable to alter,

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* *Vide* Nelsens' Paper in "Journal de Chimie Médicale," and W. Budd's Paper in "British and Foreign Medico-Chirurgical Review."

as far as possible, the inherited susceptibilities, too much care and attention cannot be given to their diet, habits, and surroundings. The rapid and incessant additions to the tissues which are taking place during the growth of children and young persons, imperatively demand as much food as the digestive organs can dispose of without being overburdened, and this food should contain all the important elements which the continuous process of development is building up the frame with. Coupled with food, fresh air takes the next important position, and to it we may add the bath, moderate gymnastic exercise, and *light* studies, enough to employ the mind without fatigue. The processes of cramming the mind of the young while the brain is rapidly developing, and forcing forward to unhealthy maturity faculties which require time for their natural and just development, is fraught with deadly evil to the nervous child, and of serious mischief to the healthiest. By it not only is there exhaustive expenditure of nerve power, but secondary irritation of the most important centres of nervous force (as the medulla oblongata), already weak in their powers of vital resistance.*

As puberty is approached the rapid evolution of the organs of sex creates a severe tax on the nervous centres throughout their whole systems. At this critical period of life, in both sexes, while nutrition is still of immense importance, anxious attention must be given to moral means of treatment.

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* *Vide* "Neuralgia," by Dr. Anstie. Macmillan, 1871.

The imagination must be allowed to slumber, if possible, and to this end a *serious aim* must be given to the daily occupations, and any kind of work, either mental or physical, which is not fatiguing or exciting, should be provided for them, and every means employed to interest them in it, and, if possible, induce them to take a pride and pleasure in the pursuit. Action, no matter what kind so long as it does not exhaust or disgust, will at this period of the bodily growth prevent nervous disturbances, if they have not already manifested themselves, and certainly check them if they have.*

This law of serious employment holds good through all functional nervous affections; in hypochondria, hysteria, chorea, epilepsy, it will be found that great benefit can be derived by occupying actively, the mental and physical powers of the sufferer, so long as such occupation has a real purpose in it, and does not partake of the character of amusement alone. In the same connexion I can fully bear out the remarks of Dr. Brown-Séquard: "How often have I not seen young epileptics kept in idleness (alas! by medical advice), and having gained more or less of the vices it leads to, improve rapidly from having their minds occupied at regular hours, in nearly the same way as healthy people of their age."†

An unsocial solitary life in the individual who

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* *Vide* "Des Fonctions et des Maladies Nerveuses," by Dr. Cerise. Paris.

† *Vide* op. cit.

has just passed the period of puberty, leading as it often does to solitary vicious habits, should be exchanged for one of action and sociability; and emotional excitements, especially such as encourage gloomy religious views in the young at a period of life when the rapid evolution of the sexual organs and feelings creates constant demands on the nutritive system and on the nervous centres, and when the judgment is not sufficiently matured to help the mind to just conclusions, should be avoided. Misdirected mental emotions, joined to the irritation of a quickly-developing sexual apparatus, have made a wreck of many promising persons of both sexes, and this almost as frequently amongst those who have no hereditary tendency to nervous diseases.

To those of maturer age who pass their lives in the perpetual harass and strain of mental labour *against time*, a seasonable word may be said here. Like every one else, they accept as a truism the effect of sudden shock producing severe mental or nervous disorder; but let them reflect that as the continuous drip of a few atoms of water on the hardest stone will eventually wear it away, so will the slow but sure influence of long-continued mental *fag* prematurely wear away the nervous tissues and produce all forms of neurotic diseases, including cerebral softening itself. And this is the class with whom the neurasthenic constitution originates to be left as a legacy to their children and their children's children.

As every effort of the mind and every action of the body involves the necessity for a discharge of

nervous force, much as a Leyden jar discharges its charge of electricity, and as every continuous exercise of the faculties requires a continuous succession of such discharges, it follows that as the generation of nerve force is produced by the act of nutrition (that is to say, that the establishment of a nutritive molecule and removal of an effete one sets free a modicum of electricity which joining others supplies the current), such process must keep pace with the discharges, hence prolonged exertion of any kind requires extra nourishment; but such prolonged exertion must be kept within certain bounds, as when it becomes excessive in its expenditure of vital force, the powers of assimilation are enfeebled, and as imperfect assimilation results in insufficient nervous supply, the vicious reaction is mutual, both nutrition and nerve force being injured.

When the hard-worked professional man, be he lay or clerical, begins to have sleepless nights or a disrelish for his food, and to experience the discomforts of dyspepsia, he may take it as a warning that the early symptoms of insufficient nerve force, and molecular perturbations in some of his nervous centres are manifesting themselves, and that he is drifting into a condition which will undermine his mental and bodily powers, unless he turns the warning to good account. Rest and agreeable change for his mind, nutrition for his tissues, especially his nervous ones, are essential to his recovery, and the longer the time which elapses before he avails himself of this advice, the nearer has he approached degeneration of his minute nervous structures, and

the more difficult and tedious will his ultimate recovery be.

As regards the quality of his food, the nervous sufferer should consume as much fat-forming material as his digestion will permit. Fat is a most important constituent of brain and nerve substance, but the fear of becoming "*bilious*" deters many patients of the class under consideration from admitting it into their dietaries. This is a great mistake, for properly proportioned in the food it is easy of digestion, and being a direct nutrient of the exhausted tissues, supplies to them the element in which they stand in need. Butter, cream, salad oil, &c., for the same reason, are very necessary; and as fat-forming food, grapes and many of the sweeter fruits may be employed as agreeable additions.

Among vegetables, seakale holds a high place as a special nutrient of brain-tissue, and the marine plant called laver, properly cooked, ranks high in the same class. While a fair amount of animal food should be consumed daily, fish (especially sea) should not be neglected, as they contain important and requisite elements. In short, while the stomach should not be overloaded nor the powers of digestion overtaxed, a large amount of generous food ought to be consumed daily. The question of stimulants in nervous diseases requires some consideration; while there is no doubt that an ounce of good French brandy in a cup of new milk, taken two hours before bedtime, will often relieve the restlessness of the exhausted nervous system, and

induce sleep; still, unless under good advice, it is a practice to be pursued with much caution, more especially as it may be attended with other drawbacks, and there are many other remedies which will produce the same good effects without any evil consequences. The best rule for guidance in the use of stimulants appears, from my experience, to be this: Take them in very moderate quantities with food only, and lessen or discontinue their use if they produce headache, flushings of the face, dryness of the tongue or throat, or any other unpleasant effect.

Persons of nervous temperament usually suffer much from cold extremities; these should be kept warm and dry at all times. The condition of the skin should receive attention; a good and regular action on the surface of the body not only assists in giving a general tone to the system, but has a most soothing and calming, not to say sustaining, effect upon the weak and irritable nerves of the neurasthenic.

In closing these observations on the general effects of nervous exhaustion, I may remark, for the comfort of the sufferers, that in all instances where there is no actual degeneration of structure (a most unusual circumstance, I should say, in the earlier stages of the disease) they may rest assured the evil can be overcome, and a healthy tone given to the system, if the general principles here laid down are followed up *persistently* and with confidence.

The neurasthenic have a strong tendency to fly

for help from one physician to another, taking the opinions of all, but following the advice of none. To these I would say, reflect on your condition; it has been brought on in the manner pointed out in these pages, and may probably have been stealing slowly on you without your cognizance for years. The state of your nervous system requires restoring and rearranging; this is a work of time, settle down patiently to the task, and you will succeed; if not, and you persist in changing from one method of treatment to another, remember you are always beginning and never getting beyond that stage; how can you, therefore, expect to see the work of restoration perfected?

CHAPTER VI.

REMEDIES.

The medicines which exercise the greatest amount of restorative influence upon the nervous centres and branches, are those which are termed nerve tonics; of these the principal are phosphorus, arsenic, zinc, manganese, silver, strychnia, iron, quinine. Some of these have a special influence on particular parts of the nervous system; as, for example, phosphorus and its compounds, the hypophosphites of soda, &c. on the cerebro-spinal substance; arsenic on the pneumogastric nerve at its origin in the brain, and along its whole course; zinc, strychnine, silver, &c., on the spinal cord. While others, as iron and manganese, exercise a peculiar influence on the transformation of food into blood, and facilitate its conversion into brain and nerve tissue. Many of these remedies produce better effects in combination, over certain conditions of the nervous centres, than when employed separately; a combination of iron, quinine, and strychnia, for example, furnishes the most powerful restorer of exhausted nerve-tissue, even when at the verge of degeneration, that we have. Strychnia alone increases the reflex faculty of the nervous centres, and acts on the sympathetic system, and through

it on the stomach, bowels, uterus, and male genitals.

Arsenic requires a special notice also, from its singularly happy combination of powers; it improves the quality and enriches the blood, a matter of vital importance in nervous diseases, and it acts as a special and healthy stimulant of the nervous system; as an anti-periodic it is peculiarly useful in those severe neuralgias which come on at fixed iuntervals. In true angina pectoris, where no organic lesion exists, it may be said to be specific.

Strychnia also requires special noticc for its extraordinary influence over the scvere and alarming visceralgiæ, especially gastralgia, on which its effects are often immediate and permanent.

In addition to nerve alteratives and tonics, whatever tends to increase the hydrocarbons in the system is worthy of attention in the treatment of these diseases. Cod-liver oil takes the first place in remedies of this class, and after it extract of malt. In all instances where the oil cannot be tolerated by a weak digestion, the malt should be freely given instead, and if combined with quinine it has a most restorative influence on constitutions in which the white corpuscles of the blood predominate over the red, as quinine arrests the amœboid movements, the white corpuscles perform and check their development and multiplication in the lymphatic and vascular glands.* Either in combination with the medicines just enumerated, or alone, onc remedy

* Binz and Geltowsky in the "Practitioner."

may be employed whose restorative and curative effects upon exhausted nerve tissues is worthy of all consideration—viz., Electricity. Nervous diseases can be cured by it alone, as they can often be by medicines alone; but in conjunction with the particular internal remedies which a knowledge of the case points out, it may be relied upon as the most certain and powerful remedial agent we can employ.

In the treatment of nervous diseases I consider the rule absolute, that recent cases should be treated by a combination of the proper internal remedies and the form of electricity adapted to the patient's condition; while in chronic cases which have already undergone an extensive medication without good results, I hold that electricity alone may be relied on as the only therapeutic agent to be employed with a hope of success.

These views are not singular, but are shared by many eminent physicians, although it is too much the habit for the ordinary practitioner to ignore the effects of electro-therapeutics. While on the other hand the advocates of electricity are too much disposed to rely on its remedial effects alone.

A wise combination of both, under the circumstances just stated, furnishes the most speedy and certain means for restoring exhausted and degenerating nerve substance, and with it nerve power. This can be fully recognised by a most casual observer, if he bear in mind what has been already shown, of the manner in which the true nerve currents are generated, the molecular arrangement

of the ultimate structure of nerve-tissue, and the electrical state of these molecules in health, and where disease is present he can readily understand what measure of success may be expected from any means which will enrich the impoverished tissues, remove molecular perturbations and aberrations, and supply the faulty and deficient currents with increased tension and volume, until by their influence the natural and healthy ones are again set into action.

It has been unfortunate, to some extent, for the English practitioner, and most certainly so for his patients, that the subject of curative electricity has not sooner taken a leading position in our great medical schools, and in the therapeutics of this country. This defect in our system of teaching is now being remedied; at most of our metropolitan hospitals, electrical rooms have been established, and courses of lectures by some of our most valued physicians have been delivered on the subject, so that the future practitioner will be furnished with accurate knowledge of the therapeutical value of the various forms of electricity, and enabled to employ them judiciously. The ignorance and prejudice, or rather supineness, which prevails at the moment with regard to electro-therapeutics, in the minds of the great mass of the non-reading portion of the profession, has its origin in conditions which formerly, and in a measure still do exist. Of these perhaps, the most formidable is the manner in which the subject has been dealt with by the ignorant and designing charlatan; the most absurd

and extravagant virtues have been ascribed to electricity, and promises held out of results to be obtained from its employment, the failure of which brought unmerited contempt on its less showy but more solid qualities. The fact of allowing patients on their own account to employ as a remedy in disease an agent as powerful for mischief in unskilled hands as for good in the hands of the thoughtful and discriminating, has itself helped to increase the prejudices concerning it.

These prejudices, at the present moment, owing to the vaunted virtues of certain forms of instrument constantly kept before the public attention, are likely to be increased manifold, amongst non-professional people, when they begin to realize the mischief, which will follow the indiscriminate employment of electrical appliances.

To the philosophic Germans, in especial, we owe much for the patience, perseverance, scientific enterprise, tempered with caution and honesty of purpose, which they have brought to bear on the study of curative electricity. Their published works on the subject reflect the highest honour on the profession, as represented in their great schools of medicine, and they have the merit of placing electro-therapeutics on a positive and scientific basis, and determining the fundamental principles to be observed in its employment.

France and America have not been behindhand in pursuing the subject in the same direction, and of late years the more eminent of our own physicians have applied themselves with ardour tempered

with critical acumen to the thorough investigation of curative electricity in all its varieties.*

Electricity is a compound substance, existing in a quiescent state in everything in nature. It consists of two distinct fluids named negative and positive; how these are constituted science is still unable to determine with certainty, but the best received theory supposes each of them to be composed of molecules which repel each other, but are attracted by the molecules of the opposite variety. The perfect balance in quantity between these two produces in a substance containing them the condition known as natural electricity. Whatever destroys this balance, liberates these fluids and produces that combination termed active electricity.

This destruction of balance is going on constantly in nature, hence there are currents of negative and positive as well as of active electricity always flowing on the earth, in the atmosphere, and in and on most things in nature, whether animate or inanimate.

These earth currents increase and subside in regular tides twice a day, and vary in quantity and quality with the seasons, and these variations affect animal life, whether healthy or diseased, exercising

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* *Vide* Dr. Reynolds' "Lectures on the Clinical Use of Electricity;" Radcliffe "On the Dynamics of Nerve and Muscle;" Myers' "Electricity in Relation to Practical Medicine;" Althaus's "Medical Electricity;" Anstie's "Neuralgia;" Drs. Beard and Rockwell's "Medical and Surgical Electricity."

the greatest influence on individuals whose nervous systems are impressionable.

The artificial application of electricity to the human body produces special physiological phenomena according to the kind used—its quantity, its tension, the position of the poles, and the locality and nature of the tissue where the application is made. When the current ascends, it increases excitability in a part, because it reverses the natural nerve-current which flows down it; when it descends, it calms and soothes it, because it mixes with the nerve-current flowing in the same direction and increases its power.* An ascending current acts most powerfully on the nerves of sensation; a descending on the nerves of motion. An ascending current increases reflex action; a descending diminishes it. An ascending current, through the spinal cord, acts upon the motor nerves by direct not reflex action; a descending, on the contrary, acts by reflex and not direct action.

Electric currents have a marked effect on the blood, and on its circulation, and also powerfully influence nutrition. The very remarkable tonic effects of the galvanic and Faradic currents on the living subject are to be explained partly by the direct physical and chemical action of the electricity, and partly by the changes of tissue which accompany muscular contractions; the increase of heat produced by the latter cause, with the corresponding increased absorption of oxygen, the modifications of

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* Producing the condition termed "Electrotonos."

endosmosis and exosmosis, the changes in the form and colour of the red corpuscles of the blood, all the recognised molecular and chemical phenomena that result from electrization of the tissues, help to account for the wonderful and often rapid increase of weight, with improvement in all the vital functions, that results from a persevering use of general electrization.

The immediate effect of electricity when judiciously applied over the body, is to produce a feeling of enlivenment and exhilaration, increased warmth of the body and relief of pain, just as is experienced when a healthy reaction follows the shower-bath, or a "header" in the sea.

Localized electrization of the head, spine, or cervical sympathetic nerve, as a rule, makes the night's rest sounder and more refreshing. When applied generally over the surface of the body, it has the permanent effect of improving the appetite and the digestive functions, and regulating the bowels.

"Another thing that electricity distinctly does, is to improve, and that most definitely, the nutrition of some parts to which it is applied. You may distinctly increase the bulk of many wasted muscles, even when the causes of that wasting differ."

"You often see in a partially paralysed limb, the tips of the fingers, and sometimes the hands, of a bluish colour, the nails dark, and the hands cold. Put them in warm water and make them warm, but the effect soon passes off. A continuous current will warm them very rapidly, and much more permanently. Sometimes in the course of a very few

minutes you will find that the blue tint has completely passed away, that the limb has become warm, and that the sensibility of the skin, diminished before, returns to its natural state. This method will do more than this; it will have a similar effect upon the underlying tissues, and thus improve the nutrition of the muscles, and possibly also of the nerves."

"It is for its so-called vital effects—*i.e.*, for its influence on vital functions—that electricity is being constantly employed. I use the term vital to denote certain changes of condition in certain tissues, which we cannot as yet explain by what we know of the ordinary 'physical forces;' such as the contraction of a muscle, the circulation in a limb, the sensation of pain, and so on."

By electricity "you can sometimes actually and immediately cure a patient. . . . . There are other diseases which you cannot cure, but may relieve. You may slowly diminish and even ultimately remove paralysis. In these cases you assist by electricity the processes which lead to the removal of pain, paralysis, or spasm; you put the patient by electrical appliances into a better position to improve or be cured by the agencies of food, medicine, rest, and time. Lastly, there is a group of cases in which though you cannot cure you can arrest the progress of disease."*

When we sum up the therapeutic effects of electricity, it will be seen how specially adapted it is

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* Reynolds, op. cit.

for all diseases having their origin in a deranged action in, or an exhausted condition of, the nervous centres. The effects of electricity when applied to the body over its whole surface may be divided into three classes:—the primary or stimulating, the secondary or reactive, and the permanent or tonic. Relief from weariness and pain is a very common primary effect, and it often occurs that even in the middle of the first application, patients who suffer indefinable nervous pains in the head, back, sides, and stomach, or experience much weakness in the limbs, are relieved. And although this effect may pass off in a few hours, the persistent repetition of the applications for a time will make the benefit received permanent.

Persons suffering from nervous diseases are very subject to cold feet and hands, as well as creeping chills over the body; on such the effect of general electrization is very agreeable, as from its power of equalizing the circulation the temperature of the surface and extremities is raised to a pleasant and healthy standard.

The secondary effects of general electrization are not often present; when they do occur it is only at the commencement of the treatment, and are to be ascribed chiefly to the new and alterative action upon the unaccustomed muscles. A sensation of soreness in the soft parts operated on is the usual symptom when any are felt; but this generally passes off in a few days, and does not return after future applications.

The most important effects are, of course, the

permanent ones. There is no fixed time when these may be looked for, as it depends on the duration and nature of the disease, the constitution of the patient, and the skill and perseverance of the treatment. They may appear early in the treatment, or remain latent until all treatment is abandoned, and then advance with steady and certain progress. The following may be taken as the order in which the permanent effects usually appear:—

Improvement in the Sleep.—As loss of sleep is the most constant and distressing symptom in many nervous diseases, its relief is one of the first effects of electricity appreciated by the patient. The importance of this fact can scarcely be overrated. Sleep is food for the nerves: its presence facilitates a readjustment of the molecular balance, a disturbance of which is the primary cause of the nervous exhaustion and all the conditions which follow it.

Increase of Appetite and Improvement in Digestion.—This is produced by direct action on the stomach and pneumogastric nerve, and although not so constant a result as the preceding is still sufficiently so to warrant enumeration.

Regulation of the Bowels.—Constipation sometimes yields very early in the treatment; but, as a rule, the improvement towards permanent relief keeps pace with the benefit felt in the other organs of the body.

Improvement in the Circulation.—Permanent equalization of the circulation is a constant effect in all cases where it is defective. This is the result of improvement in the general nutrition of the system.

Relief of Nervous and Mental Depression.—The indefinable mental distress and alarm which so often afflict the patient in hypochondriasis, hysteria, dyspepsia, and other diseases depending on nervous exhaustion, yield more surely and rapidly to general electrization than to any other course of treatment; and the remarkable ease and success with which it relieves the horrible depression of nervous invalids is sufficient to entitle it to a foremost place in medicine.

Relief of Weariness and Pain.—The indefinite, wandering sensations of uneasiness that accompany nervous exhaustion, yield quickly to the judicious application of electricity. In the severe pains of neuralgia the effects of the continuous current are very remarkable, and even in the severe lancinating pains of cancer, and other malignant diseases, the sufferings are much alleviated.

Increase in the Size and Hardness of the Muscles, and in the Weight of the Body.—Under the influence of protracted treatment the muscles are sometimes developed in size as well as in firmness, in a manner which naturally astonishes those who for the first time have their attention called to it. The body also may increase somewhat in weight; this is due to the improvement in nutrition, and is the natural consequence of good nights, increase of appetite, improved digestion, and relief of pain and mental depression.

Increased Disposition and Capacity for Labour of the Muscles and of the Brain.—Whatever tends directly or indirectly to improve nutrition must of necessity

increase the capacity for intelligence and muscular toil. Accordingly we find patients who were so feeble that even a short ride or walk was fatiguing, and who were signally deficient both in the will and the capacity for exertion, soon begin to develop under treatment an activity and vigour that is sometimes surprising. These effects are even more perceptible on the brain and nervous system generally than on the muscles. Uncertainty of memory and inability to concentrate the mind on any object are usually very trying symptoms in nervous exhaustion, and these yield in a remarkable manner to electric applications.

The genital organs are frequently corrected in their functions by general electrization. These organs are so intimately connected with the vital parts of the system by means of the ganglionic nerves that they must necessarily share in all the good or evil effects that the spine or the body receives.*

All will agree that impotence and weakness of sexual power in the male, and amenorrhœa, dysmenorrhœa, and menorrhagia in the female, are frequently associated with and may be the *results* of spinal or constitutional debility. We should, therefore, expect that these diseases, or symptoms of diseases, would be greatly benefited by the tonic effects of general electrization.

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* *Vide* Beard and Rockwell, op. cit., to whom I am indebted for much of the foregoing observations on general electrization.

In fine, there is no class of remedies which exercises so potent and so permanent remedial influences on the nutrition, molecular balance, activity and force of the brain and great nervous systems, as the different forms of electricity, when carefully and scientifically employed; and these effects can be easily understood by any one who chooses to carefully study the preceding remarks.

Before leaving this subject a few observations on the forms of electricity employed in medicine may be desirable. These are the Statical, the Galvanic, and the Faradic. The Static is the oldest form known to us, and although formerly employed by Sir William Gull in Guy's Hospital, the late Dr. Golding Bird, Dr. Clements of Frankfort, Dr. Radcliffe, and others, it had fallen into general disuse until recently, when Professor Schwander of Vienna revived it. In the form of an electric bath it is frequently employed, but as it exercises no beneficial effect on the diseases under consideration it does not come within the scope of our present observations. The Galvanic and Faradic currents are the two which exercise the most influence upon nervous exhaustion and disease generally of the brain and nervous tissues. Opinions differ on the Continent as to the special qualities of each, Duchenne of Boulogne, the distinguished founder of the French school of electro-therapeutics, placing most reliance on the Faradic current, and using it chiefly with a view to exclusively local effects; while Remak of Berlin and the great German school of electro-therapeutics consider central gal-

vanization more important, and employ it with a view not only to local but to constitutional effects. In this country the few distinguished physicians who have devoted time and attention to the subject incline to the belief that each variety has its special advantages in certain forms of disease; but, as a rule, the action of galvanism is more certain and beneficial in nervous diseases. It is also considered free from the objection of producing pain, and according to its method of application may be tonic, stimulating, or sedative.* In local as in general electrization either form may be employed where indicated.

In treating diseases of the nervous centres, trunks, and branches by electricity great care must be taken to avoid too powerful or too long continued applications. As the object is to improve nutrition and restore molecular balance these effects will be more certainly obtained by mild and short applications, for powerful and lengthy ones will produce the opposite effect to what was intended; in fact the physician employing electricity must keep constantly before him, that he may overdose his patient with electricity as certainly as he may with any other remedy. This is a very powerful argument against the self-application of this very potent agent. The operator must also be reminded that the dose must not only be mild and of short continuance, but it must not vary in strength or steadiness; for this reason he must be careful in

* Althaus, op. cit.

his choice of a battery, and avoid the use of chains, belts, discs, &c., upon whose steady and regular action no reliance can be placed. These latter, although sometimes useful in the relief of the pains of sciatica, lumbago, &c., when not too long employed, are perfectly useless in the diseases under consideration, and by their irregularity of action are more calculated to do mischief than cure disease.

Besides the remedies already enumerated there are others which, although not to be classed as nervine tonics, still exercise influences over various portions of the nervous systems and have their special and peculiar values in treatment. Of these the following merit notice :—

Iodide of Potassium, in obstinate cases of neuralgia of a syphilitic origin, where the severe pain depends on the irritation produced by pressure of *gummata* within the sheath of the nerve, and in paralysis from lead poisoning.

Bromide of Potassium, in spasmodic diseases, especially epilepsy, and as a sedative in cases of great irritability of the nervous system, and in headache from mental fatigue.

Hydrate of Chloral, in the insomnia so frequent and distressing in most forms of nervous exhaustion, and also when it arises from much mental strain and worry and precedes serious brain disease.

Cannabis Indicus, combined with other remedies, is valuable as a nervine cordial and sedative, and as a means of arresting severe attacks of sick-headache.

Bisulphide of Carbon and *Guarana* are new medicines, which of late have been extensively used to relieve the severer forms of sick-headache, especially when no benefit has been obtained by the employment of bromide of potassium or cannabis Indicus. But as these forms of headache, even when most severe, rarely resist the judicious application of galvanism, there is no particular advantage to be obtained by the employment of these drugs unless in cases where the patient cannot conveniently resort to galvanic treatment.

CHAPTER VII.

NERVOUS EXHAUSTION.

NERVOUS EXHAUSTION is usually associated with considerable functional derangement in some large organ, as the heart or stomach. When it does occur without much complication, there is generally some slight dyspeptic symptom present—a distaste for food, with, most likely, considerable flatulence. In this state the cerebro-spinal system of nerves is at fault, there being little or no derangement in the sympathetic system.

Besides the rules laid down in the remarks upon the general principles of treatment respecting diet and regimen, the remedies specially fitted for this condition must be employed. The aim here should be *direct improvement in the nervous centres:* to effect this, small doses of arsenite of soda or potass should be employed, either in combination with the phosphates of iron, the valerianate of zinc, or the oxides of manganese or silver, as the symptoms may indicate. If there be no nausea nor distaste for food, a *tea*spoonful of cod-liver oil, taken three times daily in the middle of a meal, will materially assist the treatment, especially if combined with phosphorus.

In these cases the pneumogastric nerve is generally the seat of more or less molecular derange-

ment, and as arsenic has a specific effect upon this nerve, it is here peculiarly useful in treatment. Care must be taken in its employment to so arrange the dose that all irritation of the mucous lining of the alimentary canal is avoided. This is of great importance, as neglect of this caution is likely to render the remedy useless, the irritable state of the intestine causing expulsion of the medicine before assimilation takes place.

If the patient complains of sleeplessness, and there is much irritability present, gentle sponging over the body, but more especially across the loins, over the abdomen, and down the spine, will have a very calming effect, and induce rest, if it be done just before going to bed.

The uncertainty of memory, feelings of alarm, and confusion of the mental faculties, due to the state of exhaustion, will gradually pass away as the treatment begins to take effect, and their subsidence may be taken as good evidence of improvement.

When the case is of some standing, or of a very aggravated character, gentle currents of continuous electricity passed along the spine from above downwards, and galvanization of the pneumogastric nerve will effect a cure. The influence of continuous currents along the course of the spinal nerves in restoring their molecular balance, and removing all the distressing symptoms produced by its loss, has been already pointed out in the account of the experiments of Ranke and Du Bois-Reymond, and should be taken as direct evidence of the benefit to be looked for.

The current along the spine should not be con-

tinued for more than fifteen minutes at a time; it should be very mild, and not repeated oftener than once daily. The positive pole at first should be placed closely against the posterior roots of the upper cervical nerves (on each side), and the negative upon the last dorsal. As the galvanic treatment progresses, the positive pole should be firmly but gently drawn down the course of the spinal nerves on each side for the period of the séance. The pneumogastric nerve can be galvanized by placing the positive pole below the angle of the lower jaw, and the negative on the manubrium sterni. The current should not continue longer than three minutes.

In applying electricity, the rules as to strength of dose, &c. laid down under the head of Remedies, article ELECTRICITY, must be strictly attended to.

The following case illustrates very forcibly the effect of mild continuous currents applied along the course of the nerve trunks and through the nerve centres, on whose disordered actions the functional derangements depend:—

CASE I.

T. W., æt. forty-nine years, of spare habit of body but fair muscular development, accustomed to an active life in the country, and in very easy circumstances, had been subject since his twenty-fifth year to occasional attacks of severe nervous depression without any recognisable cause.

Of late years these attacks have become frequent and of longer duration, and now have scarcely any interval between their disappearance and return.

Although his affairs are in a most prosperous condition he cannot divest himself of an indefinable sensation of impending misfortune, and is haunted by the fear of some catastrophe which will plunge his family and himself into sorrow and difficulties. His habits are and have been always temperate, and his digestion is good. He has been accustomed from his youth to a cold bath daily, which he still takes, but with an effort.

When free from an attack he is capable of great mental and bodily exertion, and overflows with animal spirits, looking on the bright side of everything; but when the attack comes on, it is as if a dark cloud had passed between him and the sun: he is gloomy, despondent, chilly, listless, without pleasure in anything, and, although not suicidal in his tendencies, wishes he was dead and out of his misery. These fits of depression and wretchedness give him no warning of their approach, but appear in the most sudden and capricious manner. After a good night's rest, in the middle of bright and cheerful associations, even in the hunting-field in the very height and excitement of the chase, they will seize him and hold him in the utmost state of depression and mental prostration.

All known forms of treatment, including homœopathy, and hydropathy, have been tried, as well as all new remedies which have arisen from time to time and been the fashion of the moment. From all these he has usually derived temporary benefit, but the attacks have soon returned. Under my care he has taken the usual nerve and blood tonics, but with very temporary relief. Looking on the

case as one of molecular perturbation of the cerebro-spinal system, I hoped by mild electric currents to restore the natural balance of the molecules, and induce a steady and continuous flow of the true nerve current, the irregular and insufficient evolution of which was the cause of his attacks. Acting on this view, I commenced in the early part of January, 1870, to pass a current of twenty cells of a Daniell's battery down the whole course of the spine for fifteen minutes daily. This was continued for a period of eight weeks. At the end of the first fortnight of treatment he expressed himself as quite recovered, and continued in capital health while under treatment. He returned to the country and remained quite well until the middle of July, when he had a relapse, but of a milder character than formerly. The former treatment was resumed, and he entirely recovered his health and spirits after a few applications. I considered it advisable, in the face of the late relapse, to persevere with the applications for some time. This was done accordingly; and they were continued until early in September, when he appeared in such capital health I felt it unnecessary to persevere longer, and allowed him to return home.

Two years have now elapsed since the last treatment, and he has had no return of the attacks. From this I infer the molecular perturbations are set at rest, and the true nerve currents, as a consequence, supplied in the necessary degree for health.

This case is a good representation of the inherited nervous constitution. The patient's ancestors had

been distinguished for great mental activity, and had achieved considerable eminence in their various walks as merchants, lawyers, politicians; his father had been a man of highly excitable temperament, who died under sixty years of age, while following a most lucrative practice at the Chancery bar, and although his own life had been one of physical exertion and enjoyment, the nervous constitution manifested itself at an early period of life.

As a contrast to the last case I may here mention one in which the condition of nervous exhaustion was clearly induced by overwork, small means, and the cares and anxieties of a growing family:—

Case II.

B. R., æt. forty-three years, merchant's clerk, son of a small farmer in Sussex, but has been in London since his fifteenth year. He is subject to fits of extreme despondency, which have been increasing in intensity and duration for some years. His countenance is pale, careworn, and anxious-looking, and the body generally has the appearance of being badly nourished. Complains much of an indescribable sensation at the pit of the stomach, which is more intolerable than acute pain; his nights are sleepless and are rendered more wretched by vivid impressions of impending danger. The appetite is capricious: he has occasionally an eager craving for food, which if not immediately gratified passes off, and is succeeded by giddiness and faintness. He remarks in himself a growing desire for

stimulants, which relieve him for the moment from the unpleasant sensation at the pit of the stomach, but very soon leave him worse than before.

A course of arsenic with small doses of cod-liver oil, occasionally varied with the syrup of the phosphates, materially improved his general health and restored the blood to a healthier condition. The disagreeable sensations at the pit of the stomach yielded to valerianate of zinc and camphor, but the general feelings of despondency and indifference continued in spite of all treatment. I then had recourse to the continuous current along the spine as in the previous case, with the addition of mild electric applications to the pneumogastric nerve, which in this case was affected, as evidenced by the indescribable sensations at the pit of the stomach. A daily application for five weeks entirely restored him to health. All treatment was stopped in the spring of 1871, and he has continued until now without relapse.

The following case merits attention on account of the cerebral and stomach disturbances, as well as the gouty temperament of the patient:—

Case III.

F. S., æt. fifty-four years, short and stout, has been actively engaged all his business life in large mercantile operations involving much mental toil and some anxiety; he has very rarely taken a holiday from business, and although he lived freely, has enjoyed robust health until about three

years previously, when he had a severe attaek of gout whieh shook him mueh at the time, and has left him in capricious health ever sinee. His present symptoms are—disinelination for active exertion, growing indifferenee to matters in whieh he formerly took a most lively interest, restless nights, drowsy days, uneertain memory and want of grasp of his ideas; bad appetite, and stomaeh so irritable that he rarely gets throngh a day without a sharp fit of vomiting. The symptom which distresses him most is of a very grave eharacter. He is seized suddenly and at irregular periods by a severe pain at the napc of the neek, which totally unfits him for all exertion, mental or bodily, and leaves him in a statc of utter and most alarming prostration. Aftcr employing varions remedies for a considerable timc, without any good result, I commeneed on the 1st July, 1870, to pass gentle streams of elcctricity along his spine every alternate day, and on the other days passing thc eurrent along the eoursc of the great sympathetic. This was done by placing the positive pole on the inner border of the scalenus anticus musele, and as near to the seventh cervical vertebra as possible, and thc negative on the epigastrium. By this means a thorongh influenee was prodneed in the principal portion of the great sympathetie system of nerves, and with marked benefit to the patient, who began to improve very speedily, and after six weeks was quite restored.

When last seen (Augnst, 1872) he eontinued in excellent health, and as he now takes things easier in business, and is carefnl in his habits, he is

likely to enjoy a very good share of health in future.

From the report of these cases, it must not be considered that electricity alone can be depended on in the cure of nervous exhaustion ; many cases yield to the judicious employment of other remedies and to strict attention to diet, &c. But in the very protracted or aggravated forms of the disease, when other remedies have failed in their expected effects, there can be no question that mild electric currents sent along the course of the faulty nerves in the same direction as the true nerve current will restore their healthy balance and remove all the distressing symptoms from which the patient has suffered. Proofs of this could be multiplied to a tedious extent; and in dealing with such cases the skill of the physicians will be best exercised in endeavouring by a careful study of the symptoms to determine the particular nervous centres at fault, and to them direct all the energies of treatment, remembering that the disease indubitably depends on loss of molecular balance somewhere, and that merely treating a symptom is temporizing, not curing.

The following case is most interesting, as it shows the effects of internal treatment alone, after the *abuse* of electricity had reduced the patient to a most pitiable state of nervous prostration :—

Case IV.

C. E., æt. forty-two years, retired cavalry officer, who had seen some service in India, was

reduced by free living and unusual and lavish expenditure of nervous power, in fact, by general debauchery, to a state of extreme nervous exhaustion. In this condition he placed himself under the care of a non-professional electrician, who appears to have employed the remedy in all kinds of unscientific and injurious ways; entailing great suffering on the patient, and increasing his general nervousness. This course was pursued for upwards of a year, and it would be impossible to describe here the violence used, and the absurdities practised upon the unfortunate gentleman during that time. He at last gave up in disgust and remained without treatment of any kind for upwards of eighteen months. On 3rd July, 1872, he consulted me. He was then in a state of extreme debility and nervousness, stooped very much as he sat, walked with an effort, his hand shook so that he had difficulty in grasping an object, and his voice was tremulous and weak; he was in fact decrepit. He complained of loss of appetite, sleeplessness, giddiness in the head, great mental depression, inability to bear the least cold, and had severe shivering fits on the slightest mental emotion, his mind and memory were very weak and unsettled and his countenance worn and haggard; in addition to these symptoms his sexual powers were nil. He took stimulants in considerable quantities as the only means of soothing and comforting him. As the electrical applications had been so much abused in his case, no form of it was used. I prescribed iron, arsenic, and extract of nux vomica instead, to

be taken twice daily, the stimulants were reduced to a minimum, and small quantities of cod-liver oil with phosphorus were given in the middle of, or immediately after, each meal. After a month's treatment the iron was exchanged for valerianate of zinc, but no other alteration was made, and at the expiration of three months from the commencement of treatment all his bad symptoms were nearly gone. He had gained 12 lbs. in weight, walked erect, was free from shivering fits, his voice was steady and strong, the appearance of decrepitude had given place to a healthy look, and his mind and memory were so much better that he was able to attend to some very intricate and harassing business without an effort, or suffering more than ordinary fatigue; his sexual system also had regained its customary vigour.

CHAPTER VIII.

DYSPEPSIA—HYPOCHONDRIASIS—MELANCHOLIA, ETC.

As the stomach and alimentary canal are governed in all their functions by the nerves supplied to them from the cerebro-spiual and sympathetic systems, it requires little consideration to understand how easily the duties of these important organs can be deranged when the systems which preside over their actions are at fault.

Diseases which were formerly supposed to be strictly localized in the stomach, liver, kidney, &c., are now known to be often merely the sympathetic effects of some mischief in the centre from which these organs draw their supplies of nerve force; or, to put it familiarly, disorders in the dependencies may be looked for when the seat of government is itself deranged.

The so-called "biliousness"—indigestion, capricious appetite, pain after food, eructations, regurgitation, acidity, flatulence, spasms, irregularity in the bowels, whether as constipation or diarrhœa, point almost always to exhaustion of nerve force somewhere, rather than to organic mischief (*i.e.*, positive degeneration of structure in the affected parts); and from what has been already said in the introductory remarks on the nervous system this fact can be

easily understood, for the mental depression, sleeplessness, restlessness of mind and body, general prostration, &c., which usually accompany dyspepsia, are symptoms which clearly point to a nervous origin. To this may be added the significant fact that dyspepsia is not the disease of the rough and coarsely fed peasant or mechanic, but of the refined and highly-civilized individual whose mental faculties are exposed to a large amount of wear and tear. One of the commonest and usually the earliest symptom of nervous exhaustion is loss of appetite; this is quickly followed by other symptoms, which gradually drift into all the miseries of confirmed dyspepsia.

The connexion which exists between the mental faculties and the abdominal contents, though complex, is yet clear to the most ordinary understanding, and the experience of almost every one furnishes familiar examples. A mental shock, whether pleasurable or painful, will take away the appetite when at its greatest activity; a blow on the head will produce nausea or vomiting, according to the degree of force used; a loaded stomach, on the other hand, brings on severe headache, while fright causes evacuation of the bladder or rectum. All these effects are produced by the intimate relation which exists between these organs and the cerebro-spinal centres, and go far to prove that dyspepsia is truly the consequence of nervous derangement in some part of that system.

This view of the nervous origin of dyspepsia does not contradict the fact that the abuse of stimulants, of opiates, of tobacco, and even of the sexual func-

tions, will produce the disease, because most certainly their constitutional effects are produced more on the nervous tissues than on any others.

When the great sympathetic system of nerves is implicated, the disease has some most important peculiarities imported into it which are only what should be expected when we reflect on the central relations and the peripheral distribution of the system. The symptoms are then rarely confined to the contents of the abdomen, but show themselves where the filaments of the nerve locate themselves and alternate with almost every form of disease or disorder in other parts of the body, until the unfortunate sufferer is looked upon by his circle as fanciful and imaginative in his ailments, while all the time he is really undergoing all the miseries of actual though erratic disease. Under the name of *Hypochondriac* he is ridiculed and reviled, or merely tolerated out of good nature.

In this aggravated form, where the cerebral, spinal, and sympathetic systems are all implicated, the leading feature of the malady is great mental depression, occurring without any apparent cause, and taking the shape, either from the first or very soon after, of deep conviction in the patient's mind that he is the victim of serious bodily disease, and he is able to describe minutely the symptoms which he fancies indicates its existence. These extraordinary sensations are pointed out by him in almost every part of his system. Many of the feelings he dwells on are quite out of the ordinary course, and to a casual inquirer appear incredible.

Hypochondriasis is always a consequence of the hereditary nervous constitution, and is induced by various causes acting on the constitutional defect. It is sometimes complicated with actual organic disease, the graver symptoms of which may be entirely obscured by it; but the percentage of cases in which this occurs is small. It is also pre-eminently the disease of middle age, rarely showing itself before fifty, and is much more common among men than women, in the latter the same condition of nervous system generally producing hysteria instead.

A careful study of the symptoms from the commencement will show that the disease does not originate in the sympathetic system, but only extends to it as it progresses. The pneumogastric nerve is evidently first affected, as shown by the stomach derangements and the presence of large quantities of gas in the stomach and bowels; then the sensorium partakes of the deranged action; the patient, without any apparent cause, concentrates his attention on some particular organ, and fancies it the seat of serious disease. This fancy is not always present; when it is, he is depressed and gloomy, but these fits pass off with the belief that he is mistaken in his presentiments, and his spirits may thus rise for a short time to extraordinary heights.

What often confirms him in his belief that he is the victim of serious disease is the condition of his digestive organs. His tongue becomes coated and pasty-looking on its upper surface, his breath is

foul, his appetite very variable, sometimes ravenous and as often altogether the reverse, while his bowels are obstinately constipated, and the stools frequently loaded with or enveloped in a network of mucus; he is also subject to occasional attacks of vomiting. When these symptoms have declared themselves the sympathetic system of nerves is fully implicated, and the disease is approaching its meridian; but before this period is actually reached the patient's temper and disposition are gradually changed, he is pre-occupied with the state of his health to the exclusion of the most important matters which at other times his interests and affections even would lead him to take the most lively and anxious interest in. The sensations which fix his attention seem at first diffused over his body, and are indescribable, but their vagueness soon passes off and is exchanged for an actual localized feeling of great discomfort or sharp pain. This sensation is usually first located at the pit of the stomach, and may be of a gnawing or burning character, or so peculiar in its feelings of distress as to be quite indescribable. With this there is often much tenderness on the surface of the body generally, showing that the termination of the sensory nerves are in a state of painful excitement.

From this period of the disease the most out of the way and anomalous symptoms may disclose themselves, making the patient appear to his friends to be the most absurd and ridiculous, while he is in reality the most afflicted and wretched of mortals. Formication of the skin, burning pains along the

course of particular superficial nerves, changing into throbbing and lancinating ones, and suddenly flying from one part of the body to another, are amongst his minor troubles; for he may be attacked by most alarming and indescribable feelings, deep seated in heart, or lungs, or liver, or bladder, or rectum, while along with these, palpitations of the heart, pulsations in the abdomen, flushings of the face, bilious attacks, jaundice, or diarrhœa swell up the measure of his miseries. None of these things are delusions, they are actually bonâ fide occurrences in the body arising from the perturbations existing in the minute structure of most important nerves.

Two real delusions are very often present. One is the belief in heart disease, and the other (in the male) in want of sexual power; in fact in confirmed and helpless impotence, most likely from spermatorrhœa. To summarize the descriptions of nervous dyspepsia and hypochondriasis in as few words as possible, we should say that the former depends on deranged action in the cerebro-spinal nervous system, while the latter is the result of the same cause with an extension of the mischief to the ganglionic or sympathetic nervous system, as evidenced by the fact that all the organs most liberally supplied from that system are the parts most severely affected. For example, the abdominal viscera from the solar plexus, the genital organs from the hypogastric plexus, &c.

The primary causes of the nerve condition which induced these aberrations, are to be found in general impoverishment of brain and nerve-tissue, involving

often loss or deficiency of elementary matter and disturbance of molecular balance. This condition, as already pointed out, involves reduction in the power of, or partial suspension of, the healthy nerve currents, the presence of which is absolutely necessary for the proper performance of organic functions; and the anomalous and often so called ridiculous feelings of the hypochondriac patient are true sensations—the jarring vibrations given off by a defective nerve current, like the broken wire of a stringed instrument.

On the conditions produced by these nerve aberrations the old routine treatment of nervous dyspepsia and hypochondriasis by blue pill, purgatives, alteratives, stomachics, &c. &c., has no permanent effect, unless it be in the direction of eventually increasing the evil. Knowing, as we now do, that the true causes of these diseases lie in the nervous centres, our efforts must be directed to such measures as will remove the morbid action going on there, and restore the healthy molecular balance. The remedies employed for this purpose, on which the most reliance can be placed, are the oxides of silver and manganese, the valerianate and sulphate of zinc, the phosphate and other preparations of iron, phosphoric acid, nux vomica, strychnia, and specially arsenic and electricity. The selection from or combination of these remedies must be made carefully and judiciously, and with a full knowledge of the purposes for which they are given, the particular portions of the nervous system at fault, and the time in which a beneficial result may be expected,

so that while every opportunity is given to a remedy to assert its influence over the disease, no time may be lost by continuing its use after its inefficiency is proved; while, on the other hand, no undue haste should allow the practitioner to change it before it has had its legitimate trial.

These cautions are necessary to guard the inexperienced against the too common practice of not persevering with a remedy because no immediate benefit is experienced from its use.

All medical treatment in these diseases is most powerfully assisted by attention to diet and regimen, and by endeavouring to employ the patient's mind in light, cheerful, and interesting occupations: idleness is as great a bane in these diseases as it is in any walk of life.

When after a fair trial of blood and nerve tonics the symptoms still continue, either in a modified or unabated form, the application of electricity will be advisable. I can scarcely speak too highly of its effects in nervous dyspepsia and hypochondriasis, and in all cases where it can be applied by an expert I would counsel its use, even before the other remedies are tried, or at all events in conjunction with them.

In nervous dyspepsia the application should be made along the course of the spinal nerves, for about twenty minutes, daily, a very mild power only being used. The pneumogastric should also be galvanized. A current of fifteen cells of Daniell's battery applied three times a week, for ten minutes at a time, will be found sufficient.

In hypochondriasis, in addition to the electric applications to the spinal nerves and the pneumogastric, the sympathetic system must be also included.

In melancholia, which may be considered an advanced state of hypochondriasis with the cerebral system more fully implicated, the same treatment with gentle applications along the base of the brain will be found most beneficial; and in those conditions of system the result of the abuse of alcohol, tobacco, opium, &c., where great nervous exhaustion is the predominant symptom, a steady perseverance in the same treatment will lead to excellent results.

I subjoin a few illustrative cases of nervous dyspepsia and hypochondriasis, and I confine myself to such as have been successfully treated by electricity after all other remedies have failed. It must be borne in mind, however, that these are extreme cases, and that a very large percentage of ordinary cases of these diseases yield to a steady persistence in the use of the remedies already named.

Case V.—*Nervous dyspepsia with considerable cerebral disturbance.*

Mr. G. F., æt. forty-six, civil engineer, of highly nervous organization, engaged in very active mental labour since his youth, has latterly been subject to attacks of headache, with vertigo and singing in the ears. He is very dyspeptic, suffers much from pain after food, acidity, and flatulency; and complains greatly of confusion of mind and inability to concentrate his thoughts on any of his business under-

takings. Of late he has made so many serious mistakes in calculations, &c., that he is afraid to trust himself in any of his office duties. He also finds the least exertion brings on attacks of severe prostration. Has been under much careful and judicious treatment, and tried all the usual remedies without any apparent benefit. After undergoing a course of hydropathy, and having given various German waters a fair trial, he commenced a course of electricity under my advice, and on January 29th, 1871, a continuous current was passed along the spine for twenty minutes, and along the course of the pneumogastric nerve for ten minutes. This was repeated daily for a month. No perceptible effect was produced the first week; early in the second week he expressed himself much lighter and better; his nights, which had been previously restless and sleepless, became good, and he felt the benefit of the sleep. As the treatment progressed the other symptoms yielded. The dyspepsia passed off, and with it, of course, the distressing weight and pain after food, and the acidity and flatulence. His mind and memory gradually resumed their power; and by the middle of March he was quite restored. He still continues in excellent health, although his nervous system is very impressionable.

CASE VI.—*Nervous dyspepsia, with irritable bowels, sleeplessness, and emaciation.*

S. R., æt. fifty years, solicitor, naturally robust, but now much broken and emaciated. His dyspepsia commenced about five years since, after severe and

continuous mental exertion consequent on carrying some private bills through Parliament. The symptoms have gradually increased in severity, and he is liable to severe attacks of headache, vomiting, and diarrhœa, coming on at uncertain intervals without any assignable cause. His mind is less vigorous than formerly, his nights are sleepless, and he is losing flesh and strength. Has been subjected to all the usual means of relief without more than temporary benefit.

The continuous current was applied as in the preceding case, and after twenty-five applications he was so much recovered it was not considered necessary to push the treatment further. The dyspeptic symptoms, headache, sleeplessness, &c., entirely disappeared, his spirits improved, and with them his capacity for business increased. With returning appetite and digestion his health and strength made visible progress, and he gradually returned to his usual robust condition.

Many more cases of nervous dyspepsia resisting all ordinary means but yielding speedily to the continuous electric current, might be cited; but the above two may be taken as tolerable examples of what occurs under this method.

Case VII.—*Hypochondriasis of long-standing, great irritability of temper, occasional attacks of nervous prostration, wandering pains in various parts of the body, sleeplessness, and feelings of general misery, &c. &c.*

H. J. R., æt. fifty-nine years, wholesale jeweller

in very extensive business, to which he has devoted all his time and attention for years without seeking any relaxation or amusement. His habits have been temperate, and his health excellent until his fiftieth year, when he had some difficulties in business which involved him in a Chancery suit with a retiring partner. His spirits and general health became much affected by this; his appetite failed him, his nights were restless, dyspeptic symptoms appeared, and he slowly drifted into a most wretched and pitiable condition of mind and body.

He is now in a very broken state, with irritable and suspicious temper, alternating with attacks of despondency or gloomy feelings of alarm and dread of an unknown but impending danger. His business, to which he was formerly devoted, is now neglected, and he takes no interest whatever in it, or in the condition or prospects of his numerous family, to whom he was formerly most tenderly attached. In fact, he is so wrapped up in himself and his ailments he can think of nothing else. As is usual in his condition, his pains attack various parts of the body in a most capricious manner, and beyond the general symptoms of exhaustion, dyspepsia, and wretchedness, he rarely gives the same description of his state twice over. All the usual remedies have been exhausted in endeavouring to cure him, and often with excellent temporary effect. Almost every means tried benefited him, either during its exhibition or for a short time afterwards; but the effect was never permanent.

In the first week in May, 1871, he com-

menced a course of electricity, which embraced the whole of the cerebro-spinal and sympathetic systems; the treatment was continued without intermission for about four months, when from the marked change in his condition it was stopped. He had lost all his feelings of wretchedness, his spirits were good, his digestion healthy, pains all gone, he took an interest in his affairs, slept well, and spoke of returning to an active business life.

In the following November he had a return of the principal symptoms, but in a less severe form. He returned to the electric treatment, which was continued until Christmas, when it was finally abandoned, as he was quite himself. Upwards of a year has now elapsed, and he remains in good health and spirits, and follows his old pursuits with his former zeal and enjoyment.

In severe and aggravated cases of hypochondriasis and melancholia it is by no means unusual to have one or more relapses, generally in a milder form, before the molecular perturbations are completely set at rest and the healthy nerve-currents thoroughly and permanently established. In such cases I find small doses of arsenite of soda or potass, with or without the phosphate of iron, as the symptoms indicate, assist materially in giving permanence to the cure.

CASE VIII.—*Nervous exhaustion and profound melancholy after a tedious confinement.*

Mrs. A. G. R., æt. twenty-nine, the wife of an Indian officer, was confined during her husband's

absence in India, and after a protracted illness, during which her baby died, she passed into a condition of great mental depression and gloom from which nothing was able to rouse her. Her physician having exhausted all the usual remedies, advised frequent change of scene, and her husband having returned, she commenced to move about from place to place with him, about eight months after her confinement. Her physical powers, which had been very weak, improved, and her appetite became moderately good, but nothing seemed to rouse her from the silent melancholy state into which she had gradually lapsed. She complained, when questioned, of severe pains in the head, and as the catamenia had not returned since her confinement, it was hoped that its restoration would remove the headache as well as the pressure on her mind and spirits. By judicious management the menstrual flow was established about eleven months after her confinement, the headache and tension in the cerebral vessels were at once relieved, and the dull, dusky complexion which had been noticed by her friends passed away and gave place to her naturally bright and clear skin; but the melancholy remained unaltered, and she continued listless and indifferent to all her surroundings, although every effort was made to amuse and arouse her.

This state of things continued until fourteen months after her confinement, when it was deemed expedient to place her under electric treatment. Accordingly, early in February, 1872, general Faradization was commenced daily. The applications

were continued for twenty minutes at each sitting, and on every alternate day a mild continuous current was passed along the base of the brain. After the third sitting she began to improve, and by the thirtieth she had become so thoroughly herself, it was not considered necessary to continue the treatment.

These cases are not rare, and as a rule the melancholia passes off without any, beyond hygienic, treatment. But very many months, not to say some years, may elapse before the mind, unaided, thoroughly recovers its elasticity; and it becomes highly desirable to resort to electric treatment to shorten the tedium of a prolonged effort at recovery.

I could swell these pages with many cases of the same character as the foregoing ones, differing somewhat in details, but agreeing in the main features, where the electric treatment has produced the most satisfactory results.

CHAPTER IX.

SPINAL IRRITATION.

In this disease there is always sure to be at least one point along the course of the vertebral column where pressure produces pain; this pain is usually accompanied by other symptoms of so suspicious a character that it requires very considerable experience indeed to be able to distinguish them from evidences of inflammatory action—a condition the very opposite to what really exists. Thus pressure at some point of the cervical vertebræ may induce nausea and vomiting in addition to pain; pressure of the dorsal vertebræ severe gastric pains, or that peculiar tenderness in the epigastrium and left hypochondrium which with the dorsal pain constitute the "*trépied hystérique*" of Briquet.

The most marked symptoms of spinal irritation bear a certain resemblance to hysteria in their general features, although essentially different from it in detail; in fact, complications of both hysteria and neuralgia with spinal irritation are not uncommon, and when present materially increase the difficulties of the case.

Besides the tenderness at fixed points of the vertebral column, other equally distinctive symptoms are usually present; of these the principal are

flying pains in the various parts of the body which receive the nervous supply from the affected nerve-centres; fits of yawning or sneezing, chills, spasmodic cough, nausea, palpitation, sleeplessness, irritable bladder, constipation, cramps, &c. When the irritation is confined to the cervical portion of the cord, headache, loss of voice, difficulty of swallowing, and spasmodic cough are present. When it is situated in the dorsal spine, severe and prolonged hiccup, disturbance of stomach and bowels, severe pains of a neuralgic character, tingling in the fingers and weakness and loss of muscular power in the arms, are the most urgent symptoms, and when the lumbar and sacral portions of the cord are the seats of the irritative action, severe pains and considerable loss of power are felt in the lower limbs, and the genital organs are much disturbed and weakened in their functions.

Many cases of severe irritation of the mucous membrane of the throat, stomach, and bowels, which are supposed to be local in their origin and are treated unsuccessfully as such, depend entirely on spinal irritation; so also do many of the attacks of difficulty of breathing, without or with cramp in the heart, which pass under the names of spasmodic asthma and angina pectoris.

One of the most distressing and intolerable symptoms in spinal irritation when it is confined to the lower cervical and upper dorsal vertebræ, is abnormal arterial pulsation, and when this manifests itself in the carotids or the abdominal aorta, the sufferings of the patient are most severe. Powerful

and long continued contractions of voluntary muscles, paralysis of the bladder and lower bowel, and diffuse cutaneous tenderness are amongst some of the most important phenomena of this extraordinary and distressing disease.

Where none of the symptoms already enumerated show themselves in a very decided form, the presence of spinal irritation may be inferred in any patient who is subject to startings in the sleep, spasmodic jerkings and dread of falling when just dozing off, twitchings of the muscles in various parts of the body, and much mental depression and distress of mind. The generative organs, especially if they have been tampered with, are usually much affected. In the male the sexual power is either very much impaired or morbidly increased for a time; in the female the functional disturbances are of a most varied character.

The statistics of spinal irritation show that of 148 cases, 26 were males and the remainder females, of whom 49 were married, and 73 unmarried and young.*

The conditions which give rise to spinal irritation, may be found in any of the causes which produce exhaustion of nerve force. Great mental or physical toil, excessive anxiety, or distress of mind, and any of the causes which in one person will produce nervous prostration, will in another induce this disease, and there can be no question

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* W. and D. Griffin, "Functional Affections of the Spinal Cord and Ganglionic System."

that the most fruitful source of it, especially in the young and immature, is excessive excitation of the genital organs, whether naturally or unnaturally produced; and of all forms of the disease this is usually the most aggravated, and although remediable, tedious and difficult of cure.

It is a curious fact recently pointed out by a distinguished writer, that in a certain class of patients, total abstinence from alcoholic stimulants produces this disease.* And this statement is borne out by the observations of Drs. Beard and Rockwell in the United States, who say that "where a large section of the most highly educated and refined are total abstainers, this disease is particularly prevalent, as in fact are most of the other evidences of nervous exhaustion."

The treatment of spinal irritation must be conducted generally on the same broad principles laid down for nervous exhaustion. Generous diet, rest from mental and physical toil, but no idleness, light, agreeable and interesting occupation, &c. &c.

The special treatment must be such as will bear particularly on the symptoms present: small and frequently repeated blisters over the tender points, general tonic treatment, more particularly the use of quinine, zinc and arsenic, and failing any benefit from these, the perchloride of iron with minute doses of strychnia will be found most beneficial. Electricity, as in all forms of nervous exhaustion, may be resorted to when other remedies fail. In-

* Radcliffe, in Reynolds' "System of Medicine."

deed, in the diffused mucous and cutaneous tendernesses so frequently present in this disease, no other treatment will permanently avail, nor will anything else overcome the obstinate contractions of the voluntary muscles, when of any standing. The form of electricity best adapted to these last, is the interrupted, or Faradaic, which may be applied for about five minutes daily to the tender surface, or the contracted muscle. A very short course is usually sufficient to complete the cure.

Much benefit will also be derived from gentle sponging of the spine with tepid salt and water. This should always be done from above downward, and not continued for more than ten minutes at a time. As the case progresses a gentle stream of cold water may be poured from the nape of the neck down the spine for about three minutes, the part afterwards rubbed dry with a soft napkin.

The following is a well-marked case of spinal irritation of eight years' duration, resisting all ordinary methods of treatment, but yielding rapidly to the action of the continuous current. It is also valuable as showing the effect upon the general nutrition of electric applications to the spinal cord, and the rapidity with which an old standing neuralgia may be cured by the continuous current :—

Case IX.

M. H., married lady, æt. thirty years, extremely emaciated, and of a highly nervous temperament. For upwards of eight years she has been troubled

with flying pains over the whole of her body, especially the chest, loins, and abdomen; and with severe neuralgia over the right eye. Her nights are sleepless, her appetite is bad, physical powers very low, there is much emaciation, and she has many hysterical symptoms. She is naturally of a very active disposition, but unable to employ her mind in any manner satisfactory to herself. Her life is spent on the couch, and her husband and friends look upon her as a confirmed invalid.

Examination of the spine disclosed three well-defined spots, slightly swollen and very painful on pressure, pressure on one between the last cervical and upper dorsal vertebræ produced most distressing sensations in the chest and stomach, and a feeling of faintness. Owing to her dread of the effects no pressure beyond the slightest touch was made on the other swollen points.

On the 16th Oct. 1871, electric treatment was commenced by placing the negative pole of a Daniell's battery of ten cells across the lowest lumbar vertebra, and extending a little into the soft parts on each side of the transverse processes. The positive pole was similarly placed across the third cervical vertebra. Weak as the power employed was, it seemed too much for her, and had to be reduced to five cells; this was kept on for fifteen minutes. On the following day the treatment was resumed at five cells, and gradually increased to ten. The negative pole was applied as before, but the positive was drawn gently down on each side of the spinal column during the whole of the sitting. The

applications were continued thus daily, with occasional special applications to the tender spots. The treatment was pursued steadily for two months; the patient by that time was able to walk moderate distances with ease, she slept well at night, her appetite was very good, for her, and she had made flesh perceptibly. It was considered advisable to suspend the applications till the spring, but when that time arrived they were not required, as she had attained such a measure of health and strength as to be considered by all her friends thoroughly restored.

I should mention that early in the treatment the brow neuralgia was most intolerable, but four applications of a mild continuous current, from the supra-orbital notch where the nerve became superficial to the distribution of its branches, entirely removed the attacks, and they did not again return.

CHAPTER X.

LOCOMOTOR ATAXY (TABES DORSALIS).

Much obscurity prevailed until of late years as to the true cause of this disease. It is now known to depend on atrophy and degeneration of the nerve-fibres for from one to two inches of the posterior columns and posterior nerve-roots of the spinal cord. These morbid processes appear to commence in the centre of the columns and travel towards the surface, and when fully established are beyond the power of any treatment; but much may be done to arrest mischief and repair damage, if the patient comes under observation before this stage is reached.

The following description conveys a tolerably accurate idea of the condition of a person suffering from this disease, the main symptom of which is a want of power to co-ordinate the movements of the lower limbs:—In attempting to walk the patient drops his heels heavily on the ground at every step he takes, and swings from side to side, throwing out his hands involuntarily to balance himself, like an unskilled rope-dancer;* his gait is hurried and staggering, the legs starting hither and thither in a

* Trousseau.

most disorderly fashion, and he can only keep his balance in walking or even standing by keeping his eyes open and narrowly watching himself; if he closes them he oscillates from side to side, and eventually falls down. In a very early stage of the disease he loses his delicacy of touch in the fingers, and is unable to use his hands in any occupation requiring nicety and firmness. He finds considerable difficulty in going up and downstairs, but with all his rambling, shambling gait he can walk over a considerable amount of ground without extraordinary fatigue. With all this peculiarity of muscular constitution there is no true paralysis present, but often severe erratic pains, chiefly in the feet and legs; these pains are boring, throbbing, shooting, or sharp and sudden, like an electric shock. One very important fact in this disease furnishes a hint for treatment. It is found that the nervous force travels at an unusually slow rate, and that an impression made on the surface of the body is not conveyed to the sensorium in anything like the time it would be in health. Thus a small object which the patient may wish to pick up cannot be lifted by him until he has allowed his fingers to rest on it long enough for the impression made on the peripheral nerves to be carried to their nerve-centres. So marked in some instances is the slowness with which an impression is conveyed, that one patient did not perceive the pain produced by the prick of a pin till twenty minutes after it occurred.*

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* Dr. Lockhart Clarke.

Locomotor ataxy is divided into four stages, two of which are decidedly amenable to treatment.

First Stage.—Twitching of the muscles, sensations of pain, cold, numbness, stinging, tingling or crawling in various parts of the face; unusual disposition in the arm or leg to "go to sleep" from very slight pressure, as of a table or chair on the ulnar nerve at the elbow or the sciatic at the back of the hip; involuntary movement of the eyelids, cheeks, or lips; jerkings and startings during sleep; spasmodic jerks in the head or stomach, mostly at night; difficulty in grasping or handling small objects, as in buttoning the dress, writing, lifting a pen or pin; sense of weakness in the limbs; diminution of or excessive increase in the sexual appetite and power; a peculiar cushion-like feeling in the soles of the feet.*

Second Stage.—Fugitive neuralgic pains in all parts of the body, coming on in paroxysms of great severity; feeling of constrictions in different parts of the lower limbs; disorder of vision, pupils unequal, squinting, &c.; injection of the conjunctiva, impairment of sexual power.

The third and fourth stages are not amenable to treatment, and need not be entered upon in a work the object of which is the cure of disease.

Locomotor ataxy, like spinal irritation, is very rare before puberty, and is often induced by extravagant excitation of the sexual organs, and rapidly increased by persistence in the habit. It does,

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* Dr. Clymer.

however, come on from other causes, such as exposure to severe cold after unusual and protracted exertion; the subjects of it are always members of families with neurotic tendencies, and it not unfrequently attacks several members of the same family.

In the first and second stages of the disease we may reckon on very great benefit from treatment, as degeneration of nerve substance has not yet taken place; in fact, by judicious means we may consider a cure as almost certain; but when these stages are passed, although much may be done to ameliorate the general condition of the patient and lessen the severity of the pains, complete recovery is hopeless.

The remedies on which, in addition to careful attention to habits and diet, the most reliance can be placed are those which exercise a special action on the particular parts in the nerve substance where the disease originates. Of these the oxide of silver and the phosphate and perchloride of iron, in conjunction with extract of nux vomica or minute doses of strychnine, will be found the most serviceable, and a persistence in their employment is strongly advised. Galvanism of the spinal cord and sympathetic nerve has been practised with much success in cases which have resisted all other treatment, by Benedikt, Meyer, Cyon, Frankhold, Onimus, and others on the Continent.

In my practice I have found gentle currents, applied directly around and through the central seat of the disease, of very marked benefit, especially when used in connexion with small doses of phos-

phorized oil; and I can very decidedly recommend this method of treatment.

The duration of the disease, if unchecked, is very variable; it may run through all its stages in a few months, or creep on slowly from one to another over a period of many years.

CHAPTER XI.

HYSTERIA.

No form of nervous exhaustion and impoverishment of nerve-tissue manifests so many and so peculiar perturbations of nerve force as hysteria. In it all parts of the nervous systems are in a state of unnatural irritability, which gives rise to local and general symptoms of so varied a character that they simulate nearly all the varieties of organic disease.

In this disease the sympathetic system of nerves is much more implicated than the cerebro-spinal, although that also is materially affected. In the severer forms the nerve substance generally, is so badly nourished that its structure seems threatened with degeneration.

The female sex is so fully identified with hysteria that it is supposed to be proper to it alone; this is an error, as it is not uncommon in delicate and anæmic males. To distinguish between hysteria and spinal irritation is often a difficult matter, as many of the symptoms are common to both, but careful examination will discover some points of essential difference; for example, in spinal irritation well marked tenderness of the surface of the body is generally present. This is also the case in hysteria;

but in the former ailment there is also, along with this superficial tenderness, the presence in the spinal column of one or more points where pressure produces not only pain but severe disturbances in distant organs, while in hysteria no such condition of the spine exists, and the tenderness of skin is under the influence of the mind; for while the slightest touch gives pain if the mind is fixed upon the act, yet if the attention is withdrawn to other matters severe pressure is endured without the patient's cognizance. In the hysteria of the female there is usually much derangement of function in the uterine system, and this was formerly (before the true nature of the disease was understood) supposed to be the cause of all the other symptoms, instead of being, like them, an effect of a certain change which has taken place in the nervous centres. Still it must be admitted that sexual disturbances of an aggravated character can and often do give rise to changes in the nervous systems, which may eventually produce great nervous exhaustion with local and recognisable lesions of the nerve centres, but the condition so produced is not hysteria.

The forms under which hysteria may make its presence manifest are as various as they are puzzling and capricious. Convulsions, motor paralysis, diminution, loss of, or perversion of sensation œdema of the joints, loss of voice, headache, vomiting, hiccup, coughing, incontinence of urine, and inability to void the contents of the bladder or rectum, are some of the symptoms which appeal to our pro-

fessional skill, and great care is necessary to determine whether these are the mere manifestations of the hysterical condition, or really evidences of serious diseases.

Hysterical paralysis is one of the most important of these anomalous symptoms. It may be reflex, originating in a local cause, as uterine excitement; or it may be constitutional, and depend on an abnormally susceptible state of the whole nervous system. Paralysis of the muscles engaged in speaking or swallowing, of the hands, the bladder, &c. &c., are not unusual. Nor is it uncommon to see one side or the upper or lower half of the body in the same paralysed state; but in all these cases, while there is unmistakable loss of power it is always more or less incomplete, and, singular to relate, while it continues the patient is usually free from all the other symptoms.

In the treatment of hysteria the principles laid down for the treatment of nervous exhaustion generally, apply with the fullest force. Strict attention to all hygienic means, to diet, habits, occupations, &c., are of great importance. Horse exercise, and as much of an open air life as possible; the bath, at first tepid, and when the circulation admits of it cold, with gentle friction over the whole surface of the body.

In this disease there is a tendency on the part of friends and attendants to ply the patient with stimulants during or on the approach of a paroxysm. This habit is very pernicious, and should be carefully avoided; so also should the too free use by the

patient, when not under medical advice, of spirit of salvolatile, ether, eamphor, and the other antispasmodies; these may give momentary relief, but they assuredly increase the mischief later, which they are meant to relieve.

Loeal treatment, or treating a symptom only, is of no use whatever in hysteria, a steady alterative action on the great ganglionic system of nerves and on the eerebro-spinal eentres will alone benefit the patient; the disease is strietly constitutional, and must be eombated by eonstitutional, means. Of internal remedies the valerianate of zinc in combination with quinine, and the oxide of manganese with tincture of nux vomica will be found the most benefieial. Where the uterine system is deranged, the various preparations of iron with or without the watery extract of aloes, as the condition of the bowels may indicate, are the best remedies.

The most direct action on the cerebro-spinal and ganglionie systems of nerves can be obtained by galvanic currents. These have a double action upon the nerve molecules; if properly applied they overcome the perturbations whieh produce all the anomalous symptoms, and they materially improve the nutrition of the nerve substance, so that steadier and more constant and continuous nerve currents are generated. These galvanic currents should be exceedingly mild, the force always the same; they should be continued for a somewhat lengthened period, and never for a longer time than from twenty to thirty minutes daily.

Benedikt* advises general Faradization as a means of allaying the highly excitable state of the peripheral nerves, and in the various forms of hysterical paralysis there is no question of the complete success of this remedy in mild or recent cases; but when the disease is of long-standing and the symptoms severe, a direct appeal must be made to the nerve centres themselves, and this can only be efficiently done by the continuous current.

Drs. Beard and Rockwell, of New York, report cases of hysteria completely cured by general Faradization. The following are abridged from their work:—

Case X.—*Hysteria of a physical origin, paroxysms of weeping, pain in the ovarian region, great hyperæsthesia.*

The patient was a young lady, eighteen years of age, who had been the victim of constitutional debility for several years, and unable in consequence to take any exercise. She complained of severe pain in the left ovarian region, which extended down the limb of the same side. She was at all times very low spirited, and indulged daily in several fits of quiet crying. These were varied by excessive paroxysms of weeping, preceded by increased and severe pain in the ovarian region. All the usual remedies had been tried without effect, and Faradization was advised as a last resource. This was applied generally for twenty times, spread over two

* "Electrotherapie," Benedikt. Wien, 1868.

months. Uninterrupted improvement followed the applications. She gradually gained strength and spirits, her fits of weeping became less and less frequent until they left her, and the irritation in the left ovarian region, to which she attributed all her other symptoms, subsided.

The same authorities point out a troublesome symptom which sometimes accompanies hysteria—viz., patches of redness on different portions of the surface of the body. This also yields to general Faradization.

Case XI.—*Hysteria caused by grief; paroxysms of weeping; unnatural redness of the skin of arms and nose.*

The patient, a young lady twenty-three years of age, had lost her sister five months previously. Before the fatal illness she had enjoyed good health and buoyancy of spirits, but as her sister's constant attendant during her illness she became very much reduced in strength, and after the death all her energy and power seemed to leave her, and hysterical symptoms set in. She was subject to terrible choking sensations, the sound of music distressed her, she had severe paroxysms of weeping, and altogether was in a most prostrate and miserable condition, in spite of all the efforts made to relieve her. She was particularly annoyed by the presence of patches of redness on her arms and nose, which became much more remarkable when her hysterical sensations were increased, and were troublesome from an increased feeling of heat in them. The

impairment of her personal appearance weighed constantly on her mind, and seemed greatly to increase her distress.

Two applications of a mild Faradaic current so benefited her, that for thirty-six hours she lost the constriction of the throat; and as the treatment continued, she improved rapidly in her general condition, and after the eighth application the red patches left entirely, and with it nearly every other unpleasant symptom.

CASE XII.—*Hysteria; violent paroxysms of weeping; great mental depression, verging toward insanity; impairment of memory; neuralgia, anæsthesia, and dyspepsia; entire recovery under general Faradization.*

The patient was a married lady, aged thirty-five years, never very strong, mother of several children. Her symptoms were intense mental depression, with paroxysms of violent crying, impairment of memory, loss of appetite, indigestion, attended with excessively annoying flatulence, neuralgia of the head, anæsthesia that shifted from place to place.

The fits of weeping and depression came on without any assignable cause; she would start suddenly from her chair, scream, and partially faint, and on recovery weep for hours. This condition appeared to her friends to partake of the character of insanity, and they seriously considered the question of placing her under restraint in an asylum.

Every form of medication had been tried by her physicians, and as no benefit had been received it

was advised to try the tonic effects of general electrization.

There was some difficulty at the commencement of the Faradaic treatment in getting her to allow the applications from her extreme nervousness; but this soon wore off, and by the time she had received the fourth application her appetite was improved, she was less despondent and nervous, her strength had increased, and her sleep had become unusually sound and refreshing, the annoying flatulence subsided, and the neuralgic pains were entirely dissipated. She was under Faradaic treatment three weeks, and at the expiration of that period her condition was as follows:—

Removal of mental depression.

Removal of paroxysms of weeping.

Strengthened memory.

Almost completely relieved of flatulence and indigestion.

Neuralgia dissipated.

Anæsthesia completely relieved.

Increase of strength.

The following occurred in my own practice:—

CASE XIII.—*Complete loss of voice (aphonia), with hysteria.*

July 15th, 1872.—M. H., æt. seventeen years, a tall, bloodless girl, of lymphatic temperament, had lost her voice suddenly about two months previously. This was the second attack; the first, which had been the result of cold, was cured by electricity, in April, 1870, after a fortnight's treatment. Owing

to considerable mental distress her health had been broken down, and she was very hysterical. She spoke in so low a whisper that she could not be understood without much difficulty. Two applications of the Faraday current restored her voice, while her general symptoms yielded to a very short course of the continuous current.

Many cases successfully treated in this manner might be cited, but the following summary will be found sufficient :—

Case XIV.

A young lady, æt. eighteen years, unable to take any exercise, complained of severe pain in the left ovarian region, extending down the limb. She was very low-spirited, and distressed her friends by her paroxysms of weeping, which came on very frequently, being preceded by increased pain in the ovarian region. She had been under medical treatment of a most judicious description for a considerable time, but no benefit was derived from it until it was combined with electricity, when twenty applications, spread over a period of two months, entirely removed her symptoms, and restored her health and spirits. The pain in the ovarian region was also completely relieved. Two years later, when accidentally seen, she was found in the enjoyment of excellent health.

Case XV.

A young lady, twenty-three years old, who had experienced a severe mental shock about a year

previously, was much troubled with choking feelings in the throat, severe palpitation of the heart, paroxysms of weeping, &c. Her powers were much reduced, and she continued in a most pitiable and prostrate condition in spite of all efforts. The constriction in the throat, which was most alarming, yielded to two applications of the current, a short course of electricity, extending over a period of not more than twenty-one days, restored her to a most satisfactory state, and she continued gradually to return to her usual good health and spirits, without further treatment.

Case XVI.

A married lady, æt. thirty-three years, subject to violent fits of crying, impairment of memory, neuralgia and a melancholy so profound as to merge into insanity, was thoroughly restored after thirty applications of the continuous current to the spinal column, and the sympathetic system of nerves.

CHAPTER XII.

NEURALGIA.

This disease is essentially one of nervous exhaustion, indicating its presence by sudden pain in a particular nerve. This pain is of a darting, stabbing, throbbing, burning, boring, or twisting character, not always present, but making its appearance either at uncertain times or at well defined periods.

At first it is not accompanied by constitutional disturbance, or by any recognisable change in the nerve itself, or the parts surrounding it, but as it becomes established its effects on the constitution are noticeable, and local changes take place.

After the earlier attacks, soreness, redness, and tenderness may continue in the neighbourhood of the nerve for a short time, but later on this becomes more or less permanent, and local mischief is developed in the tissues through which the affected nerve filaments are distributed. This mischief may consist of severe inflammations and ulcerations, or be merely congested blood-vessels.

Persons of good muscular development, and to all appearance in robust health, are often the victims of severe neuralgias. On closer examination these individuals will be found not only to be descended from neurotic ancestors, but to be them-

selves the possessors of an exhausted or worn out nervous system. "A somewhat delusive appearance of general vigour is often conveyed to the observer of neuralgic patients, by reason of the intellectual and emotional characteristics of the latter. Both ideation and emotion are indeed often very quick and active in the victims of neuralgia; but this mobility of the higher centres of the nervous system is itself no sign of general nervous strength; which last can never be possessed except by those in whom a certain balance of the various nerve functions is maintained. Neuralgics are invariably marked by some original weakness of the nervous system, though in some cases this defect is confined strictly to that part of the sensory system which ultimately becomes the seat of neuralgic pain."*

Pain, the essential symptom of neuralgia, cannot be looked upon as a manifestation of increased sensation in the nerves supplying the affected part; it is, on the contrary, due to perturbation of nerve force consequent on some dynamic disturbance in the substance of the nerve, the susceptibility to which disturbance is in exact proportion to the physical imperfection of the nerve-tissue. This susceptibility remains until imperfection culminates in complete degeneration and the nervous communications cease.†

Neuralgias may be induced by malaria, by great

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* Anstie on "Neuralgia." Macmillan, 1871.

† Ibid., op. cit.

and sudden shock, by direct violence to a nerve, by severe loss of blood, and by any cause producing mal-nutrition of nerve substance. They depend somewhat on period of life, as they rarely appear before puberty and are oftenest most severe and intractable in old age.

Any habit or pursuit which has a tendency to exhaust the nervous system renders the individual peculiarly susceptible to neuralgic attacks, hence neuralgias frequently occur as secondary ailments in persons affected by severe disturbances in one or more of the nervous centres.

It is scarcely possible to name a portion of the human body inaccessible to attacks of neuralgia; this depends on the fact that the minute filaments of the nerves of sensation are distributed through the most remote tissues, and it is in the ultimate structure of these nerves that the diseased conditions exist which manifest themselves to our senses by the feelings of pain.

The neuralgias of certain parts assume a very high degree of importance to that of others when they are situated in the neighbourhood of, or distributed through the tissues of important organs, as the brain, the heart, &c., or when in the vicinity of large and important plexuses of nerves. The neuralgias of superficial nerves gradually produce tender spots at various points along the course of the nerves, more especially where they pass from a deeper to a more superficial level, and some nerves are more prone to neuralgic attacks than others; as, for example, the fifth pair of cranial nerves, which

are responsible for all, or nearly all the neuralgias of the head and face.

There are so many causes which produce neuralgia, that it is necessary with a view to treatment to classify them according to the local or general condition in which they take their origin. All forms may be included in four principal divisions, viz. :—

Constitutional Neuralgias, which comprise all neuralgias arising from constitutional conditions, as anæmia, exhaustion, the poison of malaria, mercury, lead, syphilis, gout, rheumatism, &c.

Central Neuralgias, arising from irritation, inflammation, congestion, or other affections of the brain, or spinal cord, or from the pressure of tumours, &c., on these organs.

Peripheral Neuralgias, from local disease or injury, as a wound, bruise, pressure, &c.

Reflex Neuralgias, from reflex action.

The neuralgias of the fifth pair of cranial nerves, as already stated, are of considerable importance and usually entail an immense amount of suffering on the patient. Of these the principal are :—

Intercranial Neuralgia, affecting the nerve twigs distributed to the cerebral membranes. It commences with dull brooding weight within the cranium, followed by sensations of intense cold and acute splitting pain of a remittent character, and passes off with a sensation of bruising and soreness in the brains.

Migraine (sick-headache) usually first shows itself as puberty approaches ; it is quite independent

of any digestive derangement, but is frequently produced by excitement or fatigue. The pain is generally confined to one side of the head; is very intense, and if it lasts any time ends with a fit of vomiting which relieves it. When it is very severe the eye of the affected side is bloodshot and watery, the eyelid drooped, or convulsively jerked, light and motion are intolerable, the pulse at first slow, small and wiry, gradually rises and becomes rapid, large and compressible. The patient complains of great coldness in the feet, and as the attack passes off there is a great flow of colourless urine.

Clavus Hystericus.—In this neuralgia the pain is confined to one or two definite spots, and the sensation is as if a nail were being driven into the skull. It is usually found in anæmic females and others whose powers have been broken down by exhausting discharges.

The other neuralgias of the fifth pair of cranial nerves are as numerous as the branches of the nerve itself; some of them are very painful, while others are of a much milder character. One of them, the supra-orbital, has the singular character of being frequently produced by the sudden swallowing of a lump of ice.

The nerves affected in the neuralgias of the nape of the neck, the angle of the shoulder blade, the axilla, the forepart of the shoulder, the bend of the elbow, the outside of the humerus about three inches above the elbow-joint, the forearm, wrist, and hand are all filaments from the branches of the posterior roots of the cervical nerves. In all these

neuralgias, as in all others in nerves adjoining muscular structures, the attacks are often brought on or intensified by the movement of the muscles; some of these neuralgias arise from the reflex irritation of carious teeth.

Neuralgias depending on the posterior roots of the dorsal nerves locate themselves in the intercostal spaces, in the breasts at puberty and during pregnancy. They are often present in phthisis, and commonly follow an attack of shingles. Over-suckling, leucorrhœa, or menorrhagia frequently induce a severe neuralgic pain under the left breast, and alarm the patient by the dread of heart disease.

One serious affection of the heart—angina pectoris or heart-pang—is frequently the result of the extension of intercostal neuralgias; but this subject is so important as to justify a distinct notice for itself.*

The neuralgias of the groin, scrotum, labiæ, testes, bladder, kidney, ureters, rectum, urethra, &c., and of the lower extremities, are located in filaments from the branches of the posterior roots of the lumbar nerves, in which the dorsal nerves may be more or less implicated.

Gastralgia is a very painful and even dangerous form of neuralgia, which attacks the stomach. It differs from the pains of dyspepsia in an important particular: food and external pressure relieve it, while they aggravate the pains of dyspepsia. In

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* *Vide* chap. xiii., page 125.

fact, a distinguishing mark of neuralgia is that it oftenest shows itself when the stomach is without food and exhausted. It is always unmistakably connected with constitutional debility, is more frequent amongst women, and is often accompanied by palpitation of the heart and much mental depression. In this most painful affection, the minute branches of the pneumogastric nerve are primarily attacked; but nerve twigs from the solar, cardiac, coronary, and superior mesenteric plexuses rarely escape being implicated in the progress of the disease.

Neuralgia of the Pharynx is a very distressing ailment, which frequently attacks delicate and hysterical women. The sensations are sufficiently alarming, the patient feels as if the throat were closing up: there is a constant desire to swallow; thick gluey mucus in profuse quantities is pressed out from the mucous lining; and there is a general feeling in the throat of its being ulcerated or much swollen. Small quantities of substances, fluid or liquid, give much more trouble and pain in swallowing than large ones. In severe attacks the pain runs forwards into the tongue and backwards into the nape of the neck. The nerves which give rise to all these distressing feelings are the glosso-pharyngeal and some twigs from the pharyngeal plexus.

Neuralgia of the Larynx.—Where the neuralgic tendency exists in an individual, anything which throws a greater strain on a part that it is calculated to bear in health is sure to induce an attack of neuralgia in that part. Thus this form of the

disease is most common amongst professional singers and others accustomed to use their voices frequently in public, especially when sustained for any time at a high pitch. Clergymen, lawyers, actors, &c., are the frequent subjects of this ailment; but it must not be confounded with the condition known as clergymen's sore-throat, which is a totally different affection. In these neuralgias two distinct points of attack exist; one depending on filaments of the superior laryngeal branch of the pneumogastric nerve, where they are distributed to the vocal cords, the epiglottis, and the upper part of the windpipe generally; the other lower down in the body of the organ, where certain delicate twigs of the recurrent laryngeal nerve are distributed.

In the observations just made on the various forms of neuralgia, I have specially mentioned the nerve-trunks and branches implicated in each locality affected. Too much stress cannot be laid on the importance of thus marking out the diseased nerves and their relations to their nervous centres, as the best and in fact only certain method of treatment lies in direct action upon these nerves, and this can never be pursued with any probability of success unless a thorough knowledge, not only of their position, but of their intimate or remote connexion with other nerves or nerve-centres is first thoroughly understood and appreciated.

TREATMENT OF NEURALGIA.

The general principles of treatment must naturally be based on improving and restoring that

nerve force, the deficiency of which is the cause of the disease. Nutrition of nerve-tissue, as already pointed out, being of primary importance in all diseases depending on nervous exhaustion, great attention should be given to the diet, and patients will find themselves wonderfully benefited by as full and generous a habit of living as their digestive organs will admit of; and it is a fortunate circumstance, and speaks well for the result, if the patient has an enormous appetite or even a craving for food, for, generally speaking, the opposite condition of stomach is present amongst neuralgics, and they are unfortunately too capricious and dainty in their food to benefit by diet. Indeed, in most instances neuralgic patients, fancying the disease is aggravated by full and free living, are inclined to restrict themselves materially in food, and to leave out the very material the presence of which is actually essential to their recovery. Fat, which is a direct nutrient of the nervous centres, is of the first importance in diet, and when this cannot be tolerated at first by the weak or fanciful stomach it must be led up to by the use of fat-giving substances, until fat itself can be easily digested and relished.

A nervous, delicate, neuralgic girl, peevish, fanciful, and a martyr to sick-headache and nausea, whose nutriment has been reduced to the lowest standard, through a false estimate of the cause of her ailment, and whose mind and stomach would reject the idea of fatty food with disgust, can be brought through a course of extract of malt, milk, cream, butter, salad and cocoa-nut oil, cod-liver

oil, &c., to the fat of beef and mutton ; and, as an eminent writer on this subject forcibly and truly puts it,'" brought to a state in which she will eat spoonful after spoonful of Devonshire cream, and at the same time lose her headaches, lose her sickness, and develop the appetite of a day labourer."*

Stimulants should be taken *with great discretion* in neuralgia, and only in conjunction with food; brandy or wine may relieve the severity of a paroxysm or lessen the depression present, but these benefits are problematical, as at the best they are but temporary, and their place can be better filled by other remedies.

The medicines to which we can look with confidence for the greatest benefit are, of course, those which improve the nutrition of the nerve substance; some of these have a more special influence on neuralgic conditions than others, and a few exercise a beneficial action on particular nerve trunks ; thus strychnine acts directly on spinal nerves, and is peculiarly useful in gastralgia ; arsenic on the pneumogastric nerve, and may be given with great advantage in all neuralgias in which this important nerve is implicated.

Neuralgias depending on constitutional causes require their special remedies. In anæmic neuralgia iron is indicated ; in neuralgia from malaria quinine is the best internal remedy, while the severe neuralgias of a syphilitic origin are almost always cured by large doses of iodide of potass. Where

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* Anstie, op. cit.

sensation is defective in the parts surrounding neuralgic centres phosphorus may be given with great advantage. Combinations of two or more of these remedies must be left to the discretion of the physician in those complicated cases where the disease seems to have more origins than one.

During a severe paroxysm of pain recourse may be had to the hypodermic injection of morphine or atropine; and in the milder cases camphor, hydrate of chloral, Indian hemp, hydrochlorate of ammonia; or bromide of potass may be given internally with considerable though only temporary benefit.

As most neuralgics suffer from cold extremities, and other evidences of irregular circulation, the effect of these internal remedies will be increased if before their administration the patient places the feet in hot mustard and water, and retains them there from five to ten minutes.

In addition to the above, local irritants are sometimes employed with marked benefit, especially the ordinary blister of Spanish flies; and it is found that a succession of small blisters produces more permanent effect than a large and severe blister, the surface of which is "kept open" for a length of time.

One remedy, and that in many instances the most reliable, remains to be mentioned—namely, electricity. Its alterative and restorative actions in nervous exhaustion generally have been already fully treated of in the chapter on remedies; but it deserves especial mention here as a curative agent in neuralgia, not only because of its real value in this disease, but also because, until lately, physicians in

this country were entirely ignorant of its merits, or very slow to admit them; even now the general mass of the profession are less fully acquainted with its medicinal effects than could be wished; not, however, through any desire to neglect so powerful and reliable a means of relief, but merely from want of the opportunities requisite to arrive at a just conclusion.

The success which has attended the application of electricity in the worst forms of neuralgia has been remarkable, and is quite sufficient to entitle it to take high rank in therapeutics had it never effected any good result in any other disease.

Of the three forms of electricity the constant current is the one to be most depended on in neuralgia, and with it, as one eminent writer remarks, "the results which I have obtained have been so remarkable that even now I should distrust their accuracy were it not that they are in accord with the general result which (among minor discrepancies) may be gathered, we may fairly say, from *all* the more important researches that have lately been carried out in Germany."*

The treatment of neuralgia by electricity should never be left in unskilled hands. There is no disease in which the result so closely depends on the nature and strength of the current and the method and frequency of the applications. Cases that injudicious treatment might aggravate may, by the exercise of the skill and caution that experience

* Anstie, op. cit.

teaches, be rapidly cured; and many of the failures and disappointments experienced in the use of electricity in neuralgia have been due to the mistake of treating constitutional disease locally and the central varieties peripherically.*

In applying the continuous current, in this disease, it is found best to let the application be at regular intervals, say once a day; the time of an application should be from ten to fifteen minutes, and the strength *very moderate*. On this latter point too much stress cannot be laid, as experience proves that very great benefit may be derived from a current so mild as to be scarcely perceptible, while a powerful one frequently aggravates the paroxysms of pain, and rarely or never cures the disease.

The main circumstances to keep before us in this treatment are mild continuous currents, at regular intervals, persevered with daily for at least a fortnight after the disease has ceased to manifest itself by pain. When treatment is stopped directly pain is arrested the return of the symptoms at a very early date may be expected.

The direction of the current, whether direct or inverse, is not of much importance, but the operator should satisfy himself that it passes directly through the diseased nerve-tissue, whether it be peripheral or central; thus, for instance, if the disease depends on some morbid action within the spinal cord, or at the posterior nerve root, although the pain may be

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* Beard and Rockwell, op. cit.

felt severely in the shoulder, arm, or hand, we should place one of the poles above the highest nerve origin that could be implicated, say at the nape of the neck, while the other is held in the hand of the affected side, thus allowing the current to flow directly along the whole nerve from its origin to its distribution.

In this manner the greatest and most permanent results have been obtained. In one case reported by Dr. Wiesner, of Tubingen, where a severe facial neuralgia had existed for twenty-nine years, twenty applications of the continuous current removed the pain and other symptoms, and although there was a relapse subsequently, a return to electric treatment for a short time entirely and permanently cured it. In another case, under the care of the same physician, the patient, aged sixty-four years, had suffered from facial neuralgia for upwards of five years, and the infra-orbital nerve had been divided twice with resection of a portion of the upper jaw. On the second occasion, as no relief followed, the buccinator, the posterior dental and mental nerves were also divided in succession, and to crown all, the common carotid artery was tied in hopes of relieving the patient's suffering. All these serious operations were performed by Professor Billroth, but without any permanent benefit to the sufferer. After two months' application of the continuous current to the painful and sensitive parts for five minutes daily, the patient was completely relieved.

The interrupted current, although not so much

in favour either here or in Germany as the constant, in the treatment of neuralgias, has its warm advocates in France and America, and many cases are reported where the action of this particular form of electricity has been attended with the best results, where the continuous current has been of no avail. While cases are also recorded in which these conditions have been reversed, the interrupted current having been abandoned as useless after a fair trial, and the constant speedily effecting a cure.

In addition to these Meyer strongly advocates the use of the galvanic cautery in obstinate neuralgia, and reports upwards of twenty severe cases cured by the application of what he terms the galvanic pencil.*

These various opinions point to the important fact, that every form of electricity is useful in some variety of neuralgia, and that treatment should not be abandoned in very inveterate cases until each has had a thorough trial.

Many of the most serious and long-continued cases of neuralgia, as may be seen from the foregoing, yield to electric treatment alone, and often after all other sources of relief have failed to produce any effect, and this is so well established a fact that I would strongly advise all practitioners who are possessed of the proper apparatus, and are masters of its use, to commence their treatment of neuralgias with the daily application of the constant

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* Meyer.

current alone. In mild attacks of the ailment it is probable that one or two applications will remove it, while in the more severe forms, a more lengthened use may have the same effect, and entirely obviate the necessity for the administration of drugs. These remarks do not hold good in reference to neuralgias depending on anæmia, or profuse exhausting discharges, or arising from blood-poisons; the use of blood tonics in the first, and of such constitutional and local means in the second as the physician sees fit must not be neglected, while in *all* cases the remarks respecting diet must receive careful attention. Food, especially fatty and fat-forming food, is an essential in neuralgia, and amongst the blood tonics, iron, silver, phosphorus and arsenic will be found to deserve the highest rank.

The great mass of neuralgias depend more for their origin upon perturbation of nerve force (from molecular exhaustion) than any other cause; these are best treated by the constant current in the manner directed. Many examples of its rapidly curative effect might be cited, in neuralgias of the face, arm, hand, larynx and pharynx, neck of bladder, &c. &c.

We may sum up the treatment of neuralgias as follows:—

Neuralgias of malarial origin should be treated by quinine, arsenic or zinc.

Neuralgias of syphilitic origin should be treated by large doses of iodide of potass, or minute doses of the perchloride of mercury.

Neuralgias from the poisons of lead, mercury, &c., should be treated by small doses of iodide of potass gradually and carefully increased in strength, as first suggested by Melsens.*

Neuralgias connected with the poisons of gout and rheumatism should be treated in the first instance with arseniate of soda and baths containing sulphuret of potassium, and later on with alteratives and electricity.

Neuralgias arising from anæmia, loss of blood, the effects of exhausting fevers, &c., should be treated by iron, arsenic, mangancse, cod-liver oil, the phosphates, and strychnia.

Neuralgias arising from perturbation of nerve force, the result of nervous exhaustion, without any complications, should be treated by some form of electricity, and generally the constant current is more certain in its results than any other.

In all forms of neuralgia, except such as arise from blood-poisoning, electricity may be resorted to, either before or during any other treatment, and generally with a certainty of success.

All forms of neuralgia are benefited by a full and generous diet; by rest, change of scene and occupation, and by whatever improves the general health, and raises the tone of the whole system.

Paroxysms of neuralgic pains are best treated by hypodermic injections of morphia or atropine near the seat of pain, and the use of chloral, Indian hemp,

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* *Vide* "Journal de Chimie," 1849, p. 136; Dr. W. Budd, in "Brit. and For. Med.-Chir. Review," 1853.

and other hypnotics are desirable where sleep is required.

A very valuable combination of belladonna, stramonium, cannabis Indicus, aconita, hyoscyamus, and other sedatives has been suggested by Dr. Brown-Séquard, and its influence over the severest paroxysms is something remarkable.

CHAPTER XIII.

ANGINA PECTORIS, OR HEART-PANG.

This distressing and alarming disease frequently exists without any organic lesion of the heart or great vessels, and in such cases is of truly nervous origin, depending for its existence on serious molecular perturbation in the cardiac nerves, especially those of the aortic plexus. In its mildest form it may be classed amongst ordinary neuralgias, and treated as such, but in its more advanced or extreme character it is too rapid and deadly in its results not to merit special notice and treatment.

Angina pectoris is a rare disease before fifty years of age, and is much more frequent amongst males than females. It is rare amongst the labouring and non-thinking classes, and is most common in the professional classes and brainworkers generally.*

Individuals with the nervous diathesis are the most liable to it, and where it has once shown itself in a family it is likely to become hereditary. Fatigue, depression of spirits, distress of mind, or great anxiety will induce an attack. This usually comes on suddenly, in fact without the least warn-

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* Walshe.

ing, and the patient will in a moment experience intense pain, usually at the pit of the stomach, passing through to the back and slanting across the left shoulder to the left arm, down which it almost always runs. In the most aggravated cases the pain passes across the whole of the chest, and down both arms, and the patient feels as if his heart was pressed by an iron clamp, or crushed by a heavy weight. The outward appearance of a person in a paroxysm of angina pectoris tells its tale of acute suffering: the face is ashen grey, the lips white, with a faint violet tinge, the countenance suffused with a cold perspiration, and the expression one of intense agony. He feels, and if he is able expresses it, that he is about to die, so intolerable is the sensation in his chest; and his forebodings are unfortunately often too true, as he most certainly is unable to exist for any length of time in this dreadful state. When the paroxysm is to end favourably, the sensations gradually subside, the feeling of pressure in the chest and cramp round the heart become more endurable and slowly pass away, and the patient, much shaken and exhausted, feels the agony of impending death is for the moment gone. Many die in the first attack, but more frequently the paroxysm passes off in the manner described, and is followed at uncertain intervals by others, which unless arrested by treatment eventuate in a fatal one.

Attacks of angina pectoris are not always so sudden or severe as that just described; they may commence with intercostal neuralgia, and gradually extend to the heart, giving notice of their

approach by premonitory pains. Much obscurity formerly prevailed as to what this disease really was, but recent investigations fully determine its immediate cause to be true spasm of the muscular substance of the heart, depending on diseased action in the centres from which its sensory nervous supply is drawn; these centres are most probably located in the cerebral termination of the vagus nerve, and in the lower cervical and upper dorsal portions of the spinal cord, all of which send branches to the cardiac plexus of the great sympathetic, from which issue the coronary plexuses of nerves, which, following the course of the nutritive vessels of the heart, sink deep into its tissues and ramify through its minutest parts.

This view is confirmed by the results of treatment, which is successful only when directed to these centres, especially the vagus.

If the views lately enunciated by Dr. Radcliffe be correct, that spasm in a muscle is simply the return on the part of its ultimate fibrillæ to their natural condition of contraction when the controlling or nervous power is withdrawn, then by applying the rule here we can easily understand that spasm, or cramp of the muscular tissue of the heart, is the result of such perturbations in the nerve centres as produce discharges of nerve force, and by thus withdrawing the controlling power allows the contractile muscular tissue to assert itself, and how, if nerve force is not rapidly renewed and its governing influence over the muscular fibrillæ exerted, the continued action of the contractile force must end

in death. This appears to me the most rational ground on which the phenomena of true angina pectoris can be explained. It is opposed to the opinion of some other eminent physiologists who, while they admit the essentially nervous origin of the disease, attribute the paroxysms to paralysis of the heart. Angina may exist with severe structural change, such as degeneration of muscular tissue from disease of the coronary arteries, and the consequent mal-nutrition, and this, and other changes, may be present from flabby dilatation of the heart, to calcification of the orifice and arch of the aorta.* Yet there is no question that many, and even fatal cases occur without any alteration being discoverable in the heart itself, or its great vessels. Such cases are true neuralgias of the heart carried to the extreme point of molecular perturbation, in which generation of nervous force is suspended, or entirely destroyed.

Treatment.—During a severe paroxysm the treatment must be powerfully antispasmodic. Tincture of opium, with sulphuric ether in full doses, hot brandy-and-water, mustard poultices to the pit of the stomach and the region of the heart, hot water-bags between the shoulders, and hot bottles to the feet, must be incessantly applied until improvement takes place.

Within the last few years a new and very volatile fluid, termed nitrate of amyl, has been used to lessen the paroxysms of angina. It was first em-

* *Vide* Walshe, Latham, &c.

ployed by Dr. Brunton, in the Edinburgh Infirmary, and the result was sufficiently satisfactory to induce others to try it.

In one case the result was very remarkable. "The first sniff produced, after an interval of a few seconds, the characteristic flushings of the face, and sense of fulness in the head; the heart gave one strong beat, and then at once passed from the state of agony to one of perfect repose and peace, and at his usual bedtime he slept naturally."* In this case, however, as in others which have come under my own observation, and in some in which frequent paroxysms of what may be termed the lesser angina, were constantly occurring, a frequent return to the remedy to correct these paroxysms induced such feelings in the head that, notwithstanding the continued control exerted by the remedy over the heart symptoms, the patient preferred to bear them rather than again endure the cerebral sensations. This objection to its use cannot be urged in a first and intense paroxysm; and if there be no severe organic lesion to take the case out of the bounds of pure angina, judicious treatment, fairly followed out, should prevent a return of the attack.

After the paroxysm the treatment must be, of course, prophylactic. The patient must avoid every cause likely to induce an attack. No violent bodily or mental exertion, no indigestible or flatulent food, no sexual excess, nothing, in fact, which will excite the nervous system, especially the spinal cord, must

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* Anstie, op. cit.

be indulged in. If the circulation be weak, with cold extremities and feeble action of heart, great benefit will be received from the administration of iron and strychnine, and should structural degeneration be suspected, a combination of the phosphates of iron, strychnine, and quinine will exercise an almost extraordinary influence upon tissue nutrition. Care must be taken, however, that the quinine in this form does not produce distressing palpitation and headache. If such should be the case, it must be withdrawn.

Electricity, which at first sight might be expected to influence beneficially the diseased nerve centres, has *not* been found productive of good; this may be accounted for, in a great measure, by the extreme difficulty, if not absolute impossibility, of directing the current to the ultimate seat of the disease.

One remedy there is which exercises a very powerful effect as a prophylactic of angina pectoris: this is arsenic. Its known influence on the vagus nerve, which is so largely concerned in true angina, will account for this specific effect, which, marked as it is in all cases, is most especially so when the disease appears in persons of a highly nervous temperament.

The employment of small doses, guarded by opiates to prevent irritability of the alimentary canal, will, if prolonged for months, entirely root out the anginoid tendency, or reduce it within such compass that the merest suspicion of tightness is all that will be left. Cases of total recovery under

its use might be adduced in support of this assertion.*

In severe functional disturbance of the heart considerable benefit has been derived from the constant galvanic current. Dr. E. Fliess, of Berlin, treated nineteen cases in this manner, and permanently cured the larger number of them.

As an illustration of the powerful influence of galvanism upon the heart, the following case, occurring recently in the practice of Dr. Dobie, of Keighley, may be cited. The condition present was not one of spasm, as in angina, but of paralysis from poisoning by aconite; but it is not the less valuable here as an evidence of the direct effect produced on the heart's action through the cardiac nerves.

The patient, being drunk at the time, swallowed an ounce of Fleming's tincture of aconite (two minims of which were given afterwards to a young sparrow, and killed it in three and a half minutes). After an emetic had been given, and been followed by severe vomiting and purging, there was evidence—to use the doctor's own words—"of failing circulation; the pulse was rapid and feeble, and the feet and hands were getting cold. The use of stimulants was clearly indicated; and, in order to give ammonia and brandy, we raised the patient's head. This brought on alarming prostration: the breathing became imperceptible; there was a quan-

* *Vide* Philip, "Berlin. Klin. Wochensch.," 1865; "Neuralgia and the Diseases resembling it." Anstie, 1871.

tity of frothy mucus discharged from the mouth and nostrils; the skin became dusky; a cold, clammy sweat bedewed the face and forehead: in a word, the patient was dying. We quickly replaced his head upon the pillow, and, as he was unable to swallow, injected subcutaneously twenty minims of tincture of digitalis, and then applied galvanism to the cardiac region, and continued its use for about twenty minutes, at the end of which period the patient began to rally, and in a few minutes more was able to swallow a mixture of ammonia, brandy, and a teaspoonful of tincture of digitalis. Marked improvement followed the administration of the mixture, and it was twice repeated within an hour, by which time the breathing had become easy, and the circulation re-established. We remained with him about half an hour longer, and, before leaving, gave him a cup of strong coffee, which, however, was vomited. I saw the patient again the following morning, when he expressed his surprise at being alive, as he had taken, he said, an ounce of Fleming's tincture of aconite."*

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* "British Medical Journal," Dec. 21st, 1872. In this report Dr. Dobie attributes the patient's recovery to the tincture of digitalis, but I think the galvanism may fairly claim the merit.

CHAPTER XIV.

CHLOROSIS.

No disease more strikingly illustrates the influence exercised over the blood and nutrition by the sympathetic system of nerves than chlorosis. A deficiency of the red globules in the blood, and the presence of great debility, are well marked characteristics of the disease. This same condition is present in anæmia, but there it is produced merely by impoverishment of blood from severe loss of the fluid itself, or from some drain on the system, or from want of nourishment or the presence of some poison. The countenance, moreover, is pale and and puffy in anæmia, while in chlorosis it is a light green colour.

The labours of Becquerel, Valleix, Sandras, Eismann, Dalpiaz, and others, have proved the undoubtedly nervous origin of chlorosis, and that the deficiency of iron in the blood is an effect instead of a cause.

The theory of Professor Thomas may be accepted as fully explaining the special influence exercised by the great sympathetic system of nerves in bringing on this state—viz., "the process of development which we term puberty, is under the control of the ganglionic or sympathetic system of

nerves—which at that time must necessarily be in a condition of excessive susceptibility. It is probable that that state of exaltation is, in the female, often affected by a functional derangement which creates the collection of symptoms to which we give the name chlorosis."*

The symptoms of chlorosis are easily recognised. The disease usually comes on at or shortly after the period of puberty. Its true type is only to be found in girls and very young women. There is great debility present, and much nervous disquietude and lowness of spirits; the complexion is usually a light greenish colour; there is much pain or diffused uneasiness at the pit of the stomach, often increased by what is looked upon by many as the only remedy for the disease—viz., iron. The monthly periods are almost entirely absent; there is little or no appetite, but perhaps longing for unusual articles of diet, as lemons, raw potatoes, &c., and even cravings for chalk, cinders, &c.

This disease is familiarly known as "the green sickness"—a term which forcibly expresses the general colour of the patient.

The treatment of chlorosis is very much shortened by the persistent application for a month or six weeks of continuous electric currents along the whole course of the great sympathetic system of nerves. The disease being essentially one of mal-nutrition of the blood and the whole body, from molecular exhaustion and perturbation in the ganglionic

* "Diseases of Women," by Professor Thomas. 2nd ed.

nerves, it is quite clear that improvement of their ultimate structure and restoration of the proper nerve currents by which the perturbations will be allayed, strikes at once at the cause of the disease, and materially shortens the treatment.

There is no question that chlorosis can be cured without the aid of electricity, but not so rapidly and with the same comfort to the patient.

The internal treatment should consist of the use of such medicines as will directly nourish the nerve-centres at fault, and bring about in a somewhat roundabout way the same results as the direct current would. Of these the most reliable are the oxides of silver and manganese, and various preparations of iron, of which the best perhaps is the sulphate, either in conjunction with small quantities of the watery extract of aloes, where the bowels, as is often the case, are inert ; or in the old-fashioned combination with myrrh and potass in the compound iron mixture of the Pharmacopœia.*

Hygieuic measures should be strictly enforced in chlorosis ; great attention must be paid to diet, the food should be good and easy of digestion, and a small quantity of sound malt liquor or port wine or Burgundy, according to circumstances, should be taken daily. A tepid bath at first, with the temperature gradually lowered, but *never* quite cold, should be taken, and as much exercise in the open

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* The tincture of the perchloride with minute doses of strychnia will be found most useful in chlorosis with much nervous depression.

air, on horseback if possible, if not, on foot, should be persisted in daily, short of fatigue.

A perseverance with this treatment will gradually overcome all the unpleasant symptoms, the natural period will be restored if arrested, or brought on if it have not yet appeared; the appetite and spirits will improve, the blood become healthier, and the complexion, as a consequence, will lose its unnatural colour, and give evidence of returning health. In short, all the conditions distinctive of the disease will pass off, and the patient's health be re-established. In very prolonged and aggravated cases the recovery may be much hastened by subjecting the patient to a short course of general electrization coupled with galvanization of the spinal and sympathetic nerves. In two cases which were prolonged much beyond the usual limits, and did not respond readily to ordinary treatment, Faradization, combined with the constant current to the spinal and ganglionic systems, rapidly changed the symptoms, and produced a cure; and in five cases taken in an early stage, the electric treatment alone, without any medicine, established the menstrual flow and speedily removed the other symptoms.

CHAPTER XV.

CHOREA, ST. VITUS'S DANCE, WRY-NECK, WRITER'S CRAMP.

THE twitchings and jumpings, which are the peculiar symptoms of this disease, almost always commence in early youth; they may be brought on by any irritant cause, as the presence of worms in the intestines, exposure to cold, the rheumatic poison, late hours and excitement, beyond the power of the young and susceptible nervous system; but whatever the exciting cause, the patient is invariably of the inherited nervous constitution.

What material alterations may be present in the nervous centres have not yet been cleared up by pathologists, but it is quite certain considerable structural perturbations are going on in the motor centres of the spinal cord, and it is to rectification of these aberrations we must look for cure. Many of the milder cases of chorea recover in a few months if left wholly to nature; that is to say, the deranged action subsides naturally, and the motor centres adjust themselves without any interference. The partial choreas which affect the eyelids, cheeks, muscles of the neck, or a single limb, are more persistent and more difficult to treat than the more general and acute ones; still, by perseverance in

treatment, they can be overcome. The choreas of rheumatic origin are often associated with heart mischief, and require considerable care and skill on the part of the physician to ward off or remedy this condition. Dr. Sec, physician to the Hôpital des Enfants, Paris, states that, in his extensive experience of rheumatism in children, he frequently found it an exciting cause of chorea; and this is in accord with the experience of many others.

An hereditary tendency to insanity is often found to exist in families in which chorea is a common disease. Tubercle and other forms of the strumous constitution are also not uncommon in the families of these patients.

In treatment, the usual means for improving the general health and keeping up a fully nourished condition of system must be rigidly adhered to. The patient's attention should be kept as much as possible from dwelling on or even observing his symptoms. The spine should be sponged very gently for ten minutes night and morning with a warm solution of common salt, in addition to sponging over the whole surface of the body with tepid water every morning; careful attention should be paid to the state of the bowels, in case of any irritating accumulation being present there. The best aperient in these cases is the compound decoction of aloes, taken in small doses night and morning when required. If any ascarides are present in the lower bowel this will be certain to expel them, while it will act also as a tonic to the whole alimentary canal.

The internal remedies which have most effect on the disease are combinations of iron and phosphorus when it depends on purely nervous or strumous causes without any rheumatic complication. Where the presence of rheumatic poison is inferred, especially by the presence of endocardiac symptoms, counter-irritation over the region of the heart, and rather full doses of the tincture of the perchloride of iron must be employed; these will exercise a most beneficial effect on the chorea as well as on the inflammatory action present in the serous linings of the heart.

Electricity has been tried in chorea, but not with the same certainty of success as has been achieved by it in other diseases of nervous exhaustion. Until the true pathological condition is fully understood on which chorea depends it will be impossible to explain in a satisfactory manner why this is so. My experience leads me to believe that there is no indication present in any case which will guide us in saying with certainty whether electricity will benefit it. Some cases recover rapidly under its influence, others are certainly not benefited, while others still have the symptoms aggravated by it. Benedikt claims to have been uniformly successful in more than twenty cases of chorea treated by very mild galvanization of the spine. Meyer, on the other hand, reports unsatisfactory results from the same treatment in three cases; while Drs. Beard and Rockwell state that in one case the results were negative and in another it increased the symptoms. These last-mentioned physicians strongly

recommend the employment of general Faradization instead of galvanization of the spine, and report many cases successfully treated in this manner. My own experience would lead me to agree with their observations.

Wry-neck.

As this affection is more frequently produced by severe mental labour, distress of mind, and anxiety than by any other physical means, it may be fairly classed as a disease arising from nervous exhaustion. The symptoms show themselves gradually, the twisted condition of the muscles being very little marked at first. On the side to which the neck is turned the muscles are usually wasted or flabby, while on the other side they will be found to be hard, lumpy, and enlarged.

Electricity is the only remedy which can be relied on in this disease. The spinal accessory nerve is undoubtedly the one most at fault, and to it galvanic treatment should be particularly directed; the sympathetic and cervical spinal nerves should also be treated by the constant current, and the flabby, wasted muscles should be Faradized daily. Unless the case is of extremely long-standing this treatment will remedy the evil, but the patient must be relieved from all the causes which produced the disease or otherwise it will return.

Writer's Cramp, Scrivener's Palsy, &c.

This disease is characterized by the recurrence of spasms whenever an attempt is made to execute a

certain long practised movement of the hand. It is not confined to writers, but is found amongst all classes whose occupations require the continual action, for lengthened periods, of a certain set of muscles of the hand; and its peculiarity consists in the fact that it does not follow any of the other movements of the hand, but confines itself to the particular movement upon which, it may be, the owner's means of subsistence depend. Artists, pianists, engravers, clerks, seamstresses, milkmaids, &c., are all subjects of this disease, which is rarely local in its origin, but generally arises from diseased action in some isolated spot in the upper portion of the spinal cord.

The only treatment which has heretofore been beneficial is the electric, and complete cure is not uncommon when the case is recent, but when of long-standing nothing beyond moderate improvement can be looked for. Galvanization of the upper portion of the spinal cord and of the median and radial nerves, and Faradization of the muscles of the hand, are the most likely means to benefit the patient. Meyer reports two cases cured in this manner; and the subjoined case, in my own practice, had a very satisfactory termination.

Case XVII.

J. C., æt. forty-five years, many years book-keeper to a medical publisher, consulted me in August, 1868. His attention was first attracted to his hand by a growing inability to make a down

stroke in writing; other symptoms followed; and he was soon unable to make any use of his hand for business purposes, although in repose it seemed free from all defects. As his means depended on his power of writing, he was in great anxiety about this state, and had already commenced to train himself to write with the left hand. I applied the interrupted current to the muscles of the hand, and the continuous current to the upper cervical portion of the spinal cord, twice a week for six weeks, keeping the actions up for ten minutes each time of application. He also took small doses of strychnine during the whole of this period. At the end of this time he was quite restored, and has continued so ever since.

CHAPTER XVI.

EPILEPSY.

The symptoms of epilepsy are too well known to require any description here; that the disease is the result of some diseased action present in the great nervous centres, and that it is hereditary, are facts fully established. The labours of Dr. Brown-Séquard have made us more fully acquainted with many of the conditions on which the frequency, violence, and duration of the fits depend, and have also helped us to arrive at just conclusions as to the results in each particular case. Unless in cases where the convulsive seizures depend upon serious organic disease, epilepsy can be fairly reckoned as curable.

The old remedies for this disease—zinc, silver, copper, valerian, strychnia, &c., are now entirely superseded by bromide and iodide of potass and bromide of ammonia; these in various combinations, according to the nature of the particular case, may be relied on to control the epileptic seizures, although they do not always remove them permanently, even when taken for many months.

By electricity applied to the sympathetic system of nerves, and occasionally to the head and spine, the convulsive seizures can be relieved, and the

frequency of the attacks lessened, even after a very short course of treatment. In cases which have not been *permanently* benefited by the bromides and iodide, a full course of galvanization of the sympathetic and cerebro-spinal system should be resorted to as the only means left to effect complete restoration. Out of sixty-four cases of epilepsy treated by electricity, a large majority received immediate benefit from treatment;* and the following two cases, occurring in my own practice, would lead me to hope that careful and judicious electrical treatment, combined with the internal use of the bromides, would produce a more rapid and permanent effect in very bad cases than either treatment alone.

Case XVIII.

Miss C. W., æt. thirty-five years, a sufferer from severe epileptic fits since her fifteenth year, had taken the bromides for upwards of a year with the effect of reducing the attacks, which formerly had been very frequent and violent, to the very mildest and sometimes almost imperceptible form. Without losing the convulsive seizures altogether, she was looked upon by her relatives as fit to be trusted about; whereas formerly she could not be left for a moment in consequence of the suddenness and severity of the attacks, which were often so violent that dislocation of the shoulder-joint was not an uncommon accident during the

* Althaus's "Med. Elect."

convulsive movements of the arms. While still persevering with the medicines with every prospect of complete recovery, an unexpected family bereavement occurred which shocked her greatly, and brought a renewal of the old epileptic seizures with all their former violence. These continued unabated in spite of the increased doses of the bromide, and her friends in despair wished electricity tried as a last resource. A mild continuous current was passed through the base of the brain on alternate days, while the spinal and sympathetic systems were galvanized on the intermediate days. The treatment was persistently followed, the bromides being still given, for two months; the convulsions, which were gradually lessening in frequency and violence during the course, were then entirely removed, and the dulness and vacuity of her countenance gave place to a certain amount of brightness and intelligence.

The bromides were continued for a short time after the electrical course was finished, for fear of relapse, but the patient has continued entirely free from seizures of any kind for about four months. Whether the recovery will be permanent must of course be left to time to determine.

The next case occurring in a gentleman nearly forty years of age, contains some points of considerable interest.

Case XIX.

J. R., æt. thirty-nine years, had been subject to epilepsy as a youth, but had been free from

the attacks from his twentieth to his thirty-eighth year. About the latter period, his business, which had been very large and lucrative, fell off, commercial distresses overtook him, he was very much worried and overworked, and as a consequence the old epileptic attacks returned with great severity. He continued to have them very frequently, and when I saw him, about a year after their return, it was not unusual for him to have five or six most violent attacks in the course of the day; his memory was failing him, his temper was most irritable, and in fact he was more like a wayward and petulant child than a man. He had taken the bromides for about three months without effect, and as his friends were impatient for his recovery, it was considered advisable to resort to electricity without further delay. He was treated much as in the previous case, the bromide being still continued. Almost from the first application the seizures lessened in violence, and his nights, which had been sleepless, became good. As the course progressed the attacks became gradually feebler and less frequent, and at the expiration of two months he had not had one for ten days. The electric treatment was continued for another fortnight, making ten weeks in all, and by that time he appeared to be fully restored; his mental activity had returned, and the morbid irritability of his temper subsided. After the lapse of six months he continued well.

I need scarcely remark, that both the above were cases of true idiopathic epilepsy; had there been

organic mischief present the results would not have been so favourable.

The experience of these cases would lead me to believe that the curative effect of the bromides is more permanent and more rapidly exercised when combined with electricity than alone, and that the effects of electricity also are further increased by the action of the bromides; so that in all instances, no matter which is made the leading feature of treatment, the other materially assists it, and for this reason I would counsel their joint use in all cases of true idiopathic epilepsy. In the convulsive attacks which depend on congestion of the medulla oblongata and upper parts of the spinal cord, and in which the bromides are employed with a certain measure of success, the continuous current might be used with safety and advantage to supplement the internal treatment.

CHAPTER XVII.

ASTHMA.

True spasmodic asthma is now known to depend on "spastic contraction of the unstriped fibre cells in the lungs,"* and as these cells receive their nervous supply from the pneumogastric nerve, it cannot be doubted that the paroxysms of difficulty of breathing depend on some perturbed action going on in the nerve itself, or in the centre from which it derives its influence.

Asthma of long standing is usually complicated with other affections, as emphysema of the lungs, bronchitis, or heart disease; where it exists, pure and simple, as an hereditary disease, much may be done to arrest its progress, and even entirely remove it. The best internal medicine is undoubtedly arsenic, which, as already mentioned, exerts a peculiar and powerful influence on the pneumogastric nerve. If this be coupled with galvanization of the nerve, a successful result may be calculated on.

Dr. Wilson Philip† gave decided relief in twenty-two cases, treated by galvanism alone; and Dr. Althaus‡ reports the application of very mild doses

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* Hyde Salter "On Asthma." 2nd edition, 1868.
† Noad's "Electricity," p. 240. ‡ Op. cit., p. 522.

of the continuous current producing most excellent effects in two cases treated by him.

The following case, occurring in my own practice, illustrates the effects of the combined treatment of arsenic and galvanism in a very aggravated asthma :—

CASE XX.—*Asthma existing in a married lady.*

M. J., æt. forty-five, married, and mother of four children, had been subject to severe attacks of asthma since her sixteenth year. Both her parents were asthmatic, and she has brothers also who suffer from it. The attacks come on suddenly, and at uncertain intervals, and usually last, with intense severity, for about forty-two hours, when the paroxysm subsides. The constitutional disturbance is so great she has to remain in bed for days after, and frequently has a fresh attack before the effects of the last have entirely subsided. Her health is very much broken, and she has for a considerable time ceased to take any active part in the management of her household. All the usual remedies have been tried with varying success. She has received most benefit from the fumes of nitrate of potass, but the effect has been only temporary.

1871, March 6th.—Treatment was commenced by passing a very mild continuous current along the course of the pneumogastric, from above downwards, for two minutes. This produced no effect; and the following day the application was increased to four minutes, and continued daily for that time for three weeks. Three drops of Fowler's solution were taken twice a day during the period. The difficulty of

breathing gradually subsided, the paroxysms, which had been very frequent of late, did not return, and the spirits and strength were much improved. The galvanic treatment was stopped, but the arsenic was continued without intermission till the end of May. Eighteen months afterwards the patient remained free from the severe paroxysmal attacks; she was able to manage her household without any effort or fatigue, and although still suffering occasionally from "thickness" in her breathing, especially in very moist or foggy weather, or after much excitement, she considered herself perfectly well.

Other members of her family have been since treated in a similar manner, and with gratifying results.

CHAPTER XVIII.

DIABETES—ANÆSTHESIA.

This disease, singular as it may appear to those who are not conversant with the recent pathological investigations into its nature, takes its origin in a diseased action going on in the brain, the part affected being the roots of the pneumogastric nerve, where they help to form the floor of the fourth ventricle. In its earliest stages the disease is confined to this locality, but as it progresses other parts of the great nervous centres become affected, and general degeneration of nerve tissue is the result.

Before this stage of degeneration has been reached, the disease has been arrested by full doses of bromide of potassium, and also by galvanization of the brain, spinal cord, and sympathetic.

Dr. Austin Flint has recently published a report of three cases of diabetes decidedly benefited by the bromide;* and Semmola† has found both temporary and permanent results from Faradization and galvanization of the pneumogastric. In some cases both the quantity of urine and sugar was greatly diminished.

It appears to me much benefit might be antici-

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* "American Practitioner."

† "Comptes Rendus," vol. iii. p. 399.

pated from a combination of the two methods of treatment. The bromides of potassium and ammonium, with citrate of iron and strychnia, would exercise an excellent influence on the cerebro-spinal tissues, while the galvanic current would produce its special effect on the pneumogastric and sympathetic nerves. Galvanic applications to the pancreas and liver, at the same time, promise favourable results.

The disease is often brought on by anxiety and mental worry, and may now be classed as one of nervous exhaustion.

Anæsthesia (*loss of sensation*).

Paralysis of the nerves of sensation is not so frequent a disease as that of the nerves of motion, with which latter the term paralysis is more fully identified. Like it, it may be a symptom of central or peripheral nervous disease, or may be induced by the poisons of lead, mercury, arsenic, syphilis, diphtheria, &c., or it may be a symptom of hysteria, anæmia, or simple nervous exhaustion.

The rapidly developing constitutions of young persons predispose to this disease, and it is very prevalent among such, especially if badly nourished or overworked, either in school or business.

Persons of nervous, excitable constitutions, who are subjected to much worry of mind, or the pressure of heavy responsibilities or cares, are often affected by loss of sensation in some important part of their body, without any other symptom. These cases, as a rule, are easily curable.

Pressure on, or division of an important branch of a nerve will produce loss of sensation in all the parts supplied by that nerve below the point of injury. Tumours, aneurisms, effusions into the nerve sheaths, or the tissues which surround them, are all causes of this form of anæsthesia; so also are contused, lacerated, and incised wounds.

Loss of sensation may be one or more of four varieties—loss of the sense of touch, of the sense of pressure or weight, of the sense of heat or cold, of the sense of pain.

All or any of these conditions may be symptomatic of serious central disease beyond the art of medicine, or they may be easy of removal. On the physician, then, will rest the responsibility of determining the true origin of the disease, and taking his measures accordingly. The æsthesiometer* will materially assist him in measuring the degree of sensibility present, and checking off, from day to day, the progress made towards recovery.

Anæsthesia from the poisons of lead, mercury, arsenic, syphilis, diphtheria, rheumatism, gout, &c., are curable by the remedies mentioned for blood poison, under the head of Neuralgia.† The anæsthesia from pressure and injury require surgical interference; but the larger class of anæsthesiæ depending on nervous exhaustion, local or general, are best treated by electricity. Local and general Faradization seem to have a more permanent effect

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* Invented by Dr. Brown-Séquard in 1858.

† *Vide* page 123.

than galvanization, although the aid of the latter may be called in when the case does not respond rapidly to treatment. The following cases illustrate the benefits of this method :*—

CASE XXI.—*Anæsthesia of anterior region of right thigh, of ten years' duration.*

Mr. H., stout and vigorous, æt. twenty-nine years. The anterior part of the right thigh was so insensible to ordinary impression that the points of a pair of compasses had to be separated about fifty lines before two impressions were perceived. The prick of a pin, even when the point penetrated several lines beneath the surface, gave no pain. Errors in eating and drinking, loss of sleep, or unusual exercise, aggravated the disorder.

The limb was Faradized by applications down the spine, and to the affected limb. After receiving ten applications, the limb was restored to its natural state.

CASE XXII.—*Numbness of left hand and foot; and general debility.*

Mr. G. R., æt. forty-eight years, actively engaged in financial matters, which entailed excessive care and anxiety, experienced a feeling of numbness in his left hand, which gradually extended to the left leg and foot. He exhibited some awkwardness in locomotion, since he was not sure when the paralysed member touched the ground. The disease

* Drs. Beard and Rockwell.

had existed about two months before treatment was commenced.

Six general Faradizations completely cured him, the sensation in the leg and arm being entirely re-established.

In the same manner various cases of anæsthesia of the face, nose, inside of cheek, tongue, &c., have been successfully treated by Faradization.

CHAPTER XIX.

NERVOUS EXHAUSTION AFFECTING THE SEXUAL FUNCTIONS IN THE MALE.

The genital organs in the male are almost always affected by constitutional nervous exhaustion. Abuse of their functions is itself a very fruitful cause of an exhausted nervous system, and persistence in such abuse the greatest drawback to restoration of nerve power and health.

Sexual irregularities in the young lay the foundation for a long train of miseries, of which pains in the back and limbs, insomnia, indisposition to any effort mental or bodily, dyspepsia, hypochondriasis, phthisis, epilepsy, locomotor ataxy, &c. &c., are amongst the most serious.

The children of nervous parents are more especially the victims of severe nervous disease, thus induced; and too great care cannot be bestowed on their early training, especially as they approach puberty, to avert the influences which produce these vicious habits.

Later on in life excessive indulgence in the natural or artificial exercise of the sexual functions materially affects the nervous powers, and through them the whole of the constitution; where this occurs in an individual weakened by disease or

dissipation, the most profound nervous exhaustion may be anticipated, and nothing but total abandonment of established habits, aided by judicious medical treatment, will give the patient a chance of recovery.

So much has been made of these conditions by the charlatans whose books and advertisements deluge the country, and such powerful impressions have been produced by them on the imaginations of the sufferers, whether youth or adults, that it becomes a matter of surprise to the scientific investigator, after thoroughly examining the subject, to find how little there is in it after all. The whole train of symptoms so graphically dwelt upon, and invested with such dramatic terrors, resolves itself into the effects of one pervading cause—viz., Nervous shock passing into chronic nervous exhaustion, affecting first the lumbo-dorsal and sympathetic nerves, and afterwards the cerebro-spinal system.

This nervous exhaustion is in all cases remediable if the patient will observe the rules laid down for its restoration.

Absolute loss of sexual power is much rarer than the public, industriously trained to erroneous ideas, can conceive; but aberrations of sexual function are very common, although never of such an inveterate character as to resist judicious treatment.

These suspensions of sexual power vary considerably, according to the temperament of the patient and the exciting cause. Many continent in-

dividuals are subject to occasional seminal emissions, which never exceed the limits of health, and therefore require no interference, while others equally continent have frequent and excessive discharges which materially weaken them, and require special treatment for their arrest.

Morbid sexual desires evince a highly irritable state of the nerves supplying the parts; patients in this condition are excited by lascivious thoughts, either self engendered, or from books, and even by riding on horseback, or in ordinary carriages, or by straining at stool; with them the involuntary discharge is never semen, but merely oozing from Cowper's glands.

Involuntary discharges of semen without erection (true spermatorrhœa) are comparatively rare. Seminal emissions are very frequent. Both these conditions, as well as the irritable condition described in the last paragraph, require in treatment most careful attention to habits and diet. The patient should be directed on rising in the morning to dash suddenly about a quart of cold water three or four times over the genitals; he should then take a cold sponge-bath over the entire surface of the body (where the powers are weak, and the circulation languid this may be replaced by tepid salt-water hip-baths). The cutaneous circulation should be excited by friction with a coarse towel, and when dressed he should have ten minutes' brisk walking before sitting down to breakfast. The internal remedies should, in all cases where the digestion admits of it, consist of perchloride of iron with

strychnia. Where these remedies are badly borne, other nerve tonics can be employed, and these, with the application of electricity, will speedily restore him to perfect health, provided always the evil habits by which the ailments were induced are entirely abandoned.

Impotence, when it does exist, is a much graver condition than either of the last. It usually follows excessive sexual indulgence, or masturbation, or it may arise from any cause which lowers the vital powers. Where there is total loss of sexual desire and absence of erectile power, disease of the spinal cord may be inferred.

The usual varieties of impotence are: premature ejaculations during the sexual embrace; diminution or capriciousness of sexual desire and power of erection; entire absence of sexual appetite and erectile power. To these may be added psychical or imagined impotence.

The three first varieties of impotence are much benefited by the internal administration of nervine tonics, as iron, silver, strychnine, zinc, phosphorus, &c. &c.,* and by as full and generous a diet as the digestive organs, usually weak in these ailments, will tolerate; to this should be added galvanization or Faradization, as the symptoms indicate, of the parts specially affected.

The electrical treatment of all diseases affecting the sexual organs may be summed up as follows:—

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* A combination of phosphorus, nux vomica and quinine, often acts like a charm.

Spermatorrhœa and seminal emissions.—Faradization of the testes and vesiculæ seminales by placing one pole of the battery on the lower part of the spine, and the other against the perineum, and alternating this with applications to the testes and perineum. The application to be from five to ten minutes, and the power employed very moderate.

Where the ailments are in an aggravated form, and have not yielded to these Faradaic applications, the galvanic current should be applied direct to the opening of the ejaculatory ducts in the urethra. For this purpose an insulated urethral electrode is used, the positive pole is connected with it, and the circuit closed by applying the negative pole to the spermatic cord.

If it be considered expedient to galvanize the vesiculæ seminales alone it may be done by placing the positive electrode against the anterior wall of the rectum, a little way above the sphincter.

Diminished or suppressed seminal secretion, with loss of erectile power, requires the application of the constant current through the secreting glands themselves—the testes.

Premature Ejaculations.—The application of the constant current should be through the perineum and symphysis pubis. All forms of impotence should, in addition to local treatment, have mild continuous current passed through the spinal cord and sympathetic nerves. Even without the local applications these central currents alone will often produce very great beneficial results, in the worst forms of impotence.

In all cases of the class under notice, the electric treatment, whether continuous or interrupted, must be mild and of short duration at each application, and pain and shock must be avoided.

Impotence has been successfully treated by electricity alone, by Westring, of Sweden, with the voltaic pile; Stacquez, by the Leyden jar; Duchenne, Beard, and Rockwell, by the Faradic current; Schultz, Roubaud, Benedikt, and Althaus, by the galvanic current. I have not confined myself to the use of one current alone, and have cured many cases in the early and advanced stages, by both the Faradic and galvanic currents according to the features presented by each case, and noted in the preceding paragraphs.

Psychical or imagined impotence is by no means an uncommon affection; it is frequently associated with hypochondriasis, but may exist without it.

No malady is more distressing to the subject of it, and when it occurs in continent young men who contemplate marriage it is fruitful of much evil. Careful examination of the genitals, and of the patient's habits and general health, will soon lead the physician to a just conclusion as to the condition present, when a little judicious management on his part will relieve the sufferer's mind and dispel his dark forebodings and broodings over his supposed defects.

Aspermatism, or a power of erection without ejaculation, has been recently noticed as a disease by Dr. Van Buren; he considers it caused by "exaggerated spasmodic contraction of the muscular fibres in the

walls of the ejaculatory ducts, leading to their occlusion under extreme excitement."* Galvanization and Faradization of the walls of the ejaculatory ducts are suggested as a remedy. Believing it to arise more frequently from a sluggish state of the seminal glands themselves, I consider direct electrization of them the more certain remedy, and this view is borne out by my experience, as well as by the statements of Drs. Beard and Rockwell, who write that "from the statements of patients and results of treatment, they feel confident it does produce this result."†

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* "New York Medical Journal." The reader is referred to this work for many interesting cases of sexual exhaustion, cured by electricity.

† Op. cit. p. 517.

CHAPTER XX.

PARALYSIS.

Of all forms of disease none shows in its widest extent so conclusively the effects of exhaustion, suspension, or extinction of nerve force as paralysis. This disease admits of division into four representative classes—viz., Constitutional, Central, Peripheral, Reflex.

Constitutional Paralysis depends on some blood poison or constitutional degeneration of tissue. Of the blood poisons those generated in the course of certain diseases are the most usual, as syphilis, gout, rheumatism, &c.; while of the accidental poisons the effects of lead, mercury, and opium are most frequently met with; and according to the manner in which the poison fixes itself in the system, paralysis from blood poisons may be either central or peripheral.

Rheumatic Paralysis.—In the persistent paralysis that frequently remains after an attack of acute rheumatism, and which chiefly affects the deltoid and trapezius muscles, the extensors of the forearm, and the muscles of the lower limbs, treatment by electrization produces the happiest results. As wasting of the muscular tissue occurs in this form of paralysis if permitted to remain untreated, it is

of the first importance that the electric applications should commence before this condition is established; although even afterwards the mild continuous or interrupted current may effect a cure, but not so rapidly.

Many cases of this description have been treated by electricity, and with scarcely a single failure when the applications have been made by skilled hands.*

Syphilitic Paralysis may exist with or without structural change. As in the pains of neuralgia, loss of power in a limb may be produced by the presence of specific syphilitic *gummata* within the sheaths of the nerve trunks, by which the nerve current may be much lessened or completely interrupted.† This form may be materially benefited and often entirely removed by full doses of iodide of potass, with or without cod-liver oil, as may be indicated by other symptoms, and followed by the judicious use of iron, phosphorus, and strychnine. Syphilis has a strong partiality for producing limited *motor* paralysis, but a much weaker one for producing limited affections of the *sensory* system.‡ When these conditions are produced they quickly yield to electric treatment, combined with the internal exhibition of the remedies just mentioned.

Lead Paralysis.—The action of lead, when introduced slowly into the system, is to diffuse itself, and exert its poisonous influence, though unequally, on every nerve and organ. The upper extremities

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* Beard and Rockwell. † Eulenburg. ‡ Anstie.

are most frequently paralysed. Of 113 cases seen by M. Tanquerel des Planches 93 were paralysed in the arm, 14 in the lower extremities, and 6 generally. Upon these cases large doses of iodide of potass, cod-liver oil, and the electric bath hold out the only chances of a cure; and these remedies must be continued for a considerable time.

Hysterical Paralysis.—In this disease the entire nervous system, as shown in a previous part of this work,* is in a condition of abnormal susceptibility; to this state may be added some deranged condition of the genital organs, the irritation of which is capable of setting up severe reflex action. In this disease the paralysis may assume the form of general paralysis, paraplegia, hemiplegia; or it may settle in various parts, as the hands, the larynx, the bladder, &c.

In 113 cases of hysterical paralysis reported on by Dr. Briquet 6 were general, 46 affected the left arm and leg, 14 the right arm and leg, 5 both arms, 7 the left arm, 2 the right arm, 18 both lower limbs, 4 the left lower limb, 2 the hands and feet, 6 the face, 3 the larynx, 2 the diaphragm.†

Hysterical paralysis, as a rule, is of short duration, and readily yields to counter-irritants and the internal use of zinc, especially the valerianate. Where derangements or obstructions of the sexual organs are present attention must be directed to their rectification or removal. In some cases the

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* *Vide* page 97.

† Reynolds' "System of Medicine," vol. ii. p. 656.

paralysis is very persistent, and where this occurs localized and general galvanization and Faradization, in addition to the other treatment, will quickly restore the patient to health. Hysterical paralysis of the left arm, in a young lady eighteen years old, and the same condition of the right side in a married lady, aged twenty-seven years, were entirely cured by a short course of general Faradization. Another case of hysterical paralysis of the right thigh and leg, with wasting of the muscles, which came under my notice, was rapidly cured and the nutrition of the muscles restored by the same means.

Central paralysis, or paralysis from morbid conditions of various portions of the nervous centres, may arise from causes independent of nervous exhaustion; as the pressure of tumours, of blood or serum effused, of a coagulum, &c.; but the ultimate cause of most lesions of the nervous system may be traced to mal-nutrition and exhaustion; many even, whose proximate cause is mechanical, as pressure from effusion, from a clot, have their ultimate rise in some alteration in the nutrition of the part primarily affected.

Hemiplegia, or paralysis of one side of the body, is the commonest form of central disease, and if it be taken early enough is very amenable to treatment, unless it depend on a cause which cannot be removed, as the presence of a tumour, &c. But complete recovery, it should be mentioned, is rare; although the improvement obtained, especially by electric treatment, is very considerable, while in

paralysis of sensation, in muscular wasting in paralysed limbs, and in cases combined with psychical conditions, as hypochondriasis, &c., the recoveries are almost perfect.

Paraplegia, or paralysis of the lower half of the body, has its origin in some morbid condition of the spinal cord. It is often produced by spinal exhaustion alone, without any actual degeneration of tissue or pressure. Such cases are curable; but much difficulty is experienced in deciding whether a case is actually one of molecular exhaustion or depends on the graver varieties of disease in the central substance. Many cases of pure spinal exhaustion have been treated mainly by electricity, and with the most satisfactory results.

Paralysis depending on local causes, as the action of cold on the superficial distribution of nerves, the local effect of poisons, &c., answers well to treatment. In the subjoined cases it will be seen that the internal exhibition of phosphorus, arsenic, silver, iron, zinc, &c., was combined with the electric treatment, and I have no doubt the specific actions of both the internal and external remedies were heightened by this method.

The first case (in which the muscles of the paralysed limb were soft, loose, and wasted) is a good example of the condition which frequently remains after what is called a "paralytic stroke." In this state all active disease in the brain is gone for the time, but there is a tendency to slow degeneration of its substance, only to be arrested by prompt and judicious treatment. In the second case there is

still sufficient morbid action present in the head to keep up an irritative action on the nerves which pass from it to the affected limbs. This action may be either the gradual contraction of a cicatrix in the brain, after laceration of its substance, low inflammation of its investing membranes, or the pressure of a clot of blood not absorbed after the original apoplectic seizure.

Case XXIII.—*Paralysis of the left side after an apoplectic seizure.*

W. G., æt. sixty-two years, manager of a public company in London, had an apoplectic fit on the 5th July, 1869; he remained unconscious for upwards of three weeks and then gradually recovered, without any untoward symptoms.

On the 12th of October following he excited himself very much in an argument with a friend, and was seized with a second fit, of great severity; from this he slowly recovered, but with complete loss of motion and partial loss of sensation down the whole of the left side.

This paralysed condition resisted all the usual methods of treatment, which were vigorously employed for the following three months. Early in the February of 1870 he consulted me, when I found him in the following condition:—

Countenance natural, intelligence perfect, slight thickness in articulation, pulse on the unaffected side 72, at the paralysed wrist 65, appetite and general health good. The left arm, unless supported by a sling, hung helplessly by his side. The

thigh and leg on the same side had lost all power of motion, and were dragged after him when he attempted to walk. The temperature was below the ordinary standard, and the paralysed muscles in both limbs, soft, loose, and wasted. The urine was abundant, but phosphatic.

The general symptoms indicated the absence of all active disease in the brain, but the presence of the phosphates in the urine pointed to a new danger—viz., degeneration of brain-tissue from the breaking down and insufficient supply of its constructive elements. I passed a gentle continuous current through the head with excellent effect, and ordered him small doses of phosphorus twice a day. Faradization of both upper and lower extremities to be performed twice a week. After a month's treatment the phosphates having disappeared from the urine, the continuous current through the brain and the phosphorus were discontinued, but the application of the interrupted current was continued for two months longer, at the end of which time the power of locomotion and sensation were fully established, and the patient was able to follow the active pursuit of a very arduous business. He still continues in excellent health, and I think will avoid future apoplectic seizures by pursuing a special regimen prescribed for him.

Case XXIV.

In direct contrast to the above I may cite the case of T. G., æt. fifty-two, a land surveyor, who consulted me in the early part of 1870. Four

months previously he had been thrown out of a gig in one of the public thoroughfares and carried in a state of insensibility to the nearest police station, where he remained for some hours until traced out by his friends. He was supposed to be intoxicated, but a little examination proved him to be in a fit. He remained some days unconscious, but gradually recovered with paralysis of the right arm and hand. The limb at first hung down by his side perfectly powerless, but by degrees the fingers began to contract on the hand, the hand on the wrist, and the forearm on the arm, and he was in this condition when I saw him. A little gentle violence on my part extended the forearm and hand, but they immediately resumed their flexed position when the force was withdrawn.

He complained of slight giddiness and pain in the head; said he slept badly and his appetite was impaired; otherwise he had no special symptoms. The urine on examination was found to be healthy.

The tense and contracted condition of the muscles of the limb, coupled with the giddiness and pain in the head, indicated the existence of some irritating cause in the brain, probably a low inflammatory action in its membranes. As he would not have borne depleting nor counter-irritation, and the benefit likely to be derived from that treatment was very problematical, I commenced passing gentle streams of electricity through the left hemisphere of the brain, giving him at the same time small doses of arsenic internally as a powerful alterative. After six weeks' treatment the muscles of the arm

and hand had returned to their natural state of efficiency, and the unpleasant sensations in the head were entirely removed.

In this case no application was made to the affected limb, as the symptoms were altogether dependent on the irritation set up in the brain itself.

Cases of both the above forms of paralysis, depending on conditions of the brain, and usually following an apoplectic seizure, are very common, and other successful instances of treatment might be given.

CASE XXV.—*Loss of sensation and partial loss of motion from exhausted brain-power.*

J. C., æt. forty-five, a member of the Stock Exchange, consulted me in April, 1868. He complained of considerable prostration generally, and almost total loss of sensation in the hands and fingers of both sides. There was a certain amount of motive power in the fingers, but much less than natural. I found he had been exposed to considerable mental strain for some time past. His health was bad, he complained of partial loss of memory, giddiness, and a feeling as if the ground rose up towards him when he walked. His urine threw down phosphates. He was evidently suffering from an exhausted brain and nervous system due to overwork. I prescribed rest from business, generous diet, small doses of phosphorus thrice a day, and the passing of very gentle continuous currents through the brain twice a week for five minutes each time. After one month's treatment he was

quite recovered and able to return to business, but was cautioned to avoid his old habits of excitement.

These cases are very common amongst men exposed to great mental strain; they cause great alarm and unhappiness to the patient and his family, who naturally anticipate serious consequences. There is no doubt the wear of brain-tissue, as evidenced by the phosphatic urine, would end in degeneration of its substance if allowed to continue, but under prompt treatment these cases always do well.

Case XXVI.—*Paralysis of the right arm from injury.*

W. W., schoolmaster, æt. thirty-seven, of delicate constitution, while suffering from an attack of rheumatism in the winter of 1869, jarred his shoulder and arm in an attempt to break a thick coating of ice in a water-butt. He complained of much pain, and inability to use the arm and hand, which continued till the early part of June, 1870, when he consulted me. On examination I found the arm and shoulder a good deal wasted; sensation was present; and he could grasp objects brought near him with the hand. He was, however, unable to use the limb in any way. From the history given me I expected to find some local mischief in the neighbourhood of the shoulder-joint, or in the origins of the surrounding muscles, but on careful examination failed to discover anything there to account for his condition. He was evidently then suffering from injury to the nerves supplying the limb. I prescribed the application every alternate

day of the interrupted current to the muscles of the arm and forearm for ten minutes each time. This was done for twenty times, when the muscular action was quite restored. The stiffness in the shoulder (evidently the remains of the rheumatism) continued a little longer, but yielded to small doses of iodide of potass.

Case XXVII.—*Paralysis of the bladder and rectum, with partial paralysis of the lower limb from an accident.*

M. J., æt. twenty-nine years, a married lady, was travelling by rail in August, 1868, when on approaching a station a slight accident occurred to the train; she was jerked violently forward and then thrown backwards on her seat, which she struck with some violence. She was not aware of any injury beyond a few bruises until she reached the station, when on attempting to rise from her seat, it was found she had lost all power of motion in her lower limbs. On removal to her home medical advice was at once obtained, and she remained under treatment for upwards of six months, during which time she was seen by more than one physician and surgeon of eminence.

In February, 1869, I saw her. She had then recovered the use of her right leg, and slightly so of the left, but the sphincters of the bladder and rectum were still paralysed. I commenced at once the cautious application of the continuous current, placing one electrode over the middle of the dorsal spine and the other alternately to the

bladder and rectum. This treatment was alternated with the application of the interrupted current to the paralysed limb itself. A month's treatment had produced an improvement sufficiently great to warrant a continuance, which was done accordingly until the middle of May, when complete control over both bladder and rectum was established, and she was able to walk with very slight effort. Her general health had suffered considerably from her long illness. I advised her removal to the seaside. She went to Margate, and returned in September in perfect health.

Case XXVIII.—*Infantile paralysis.*

F. G., æt. nine years, had convulsions when teething, and recovered with a paralysed condition of the right leg.

He had been about seven years in this state when I first saw him, February, 1867.

On examination I found the limb much wasted and apparently shorter than the other. He walked with some difficulty and drew the leg after him. When he stood still the heel was off the ground, and he rested on the toes.

He was an extremely nervous child, and evidently in a generally broken state of health. I prescribed cod-liver oil with phosphate of iron and the application of the interrupted current twice a week for three months. At the end of that time the limb was perceptibly increased in size and muscular power, but the halt in walking still continued. I advised the treatment to be persevered in for three

months longer, which was done. Early in September I carefully examined the limb, and found it much the same size as the unaffected one, but still shorter; there was very little difficulty in walking, but a slight halt remained. I prescribed a short residence on the coast with cold sea-bathing and shampooing. This course was pursued until the end of October, at which time the boy was almost perfectly recovered.

Many cases of infantile paralysis recover under this plan of treatment, but rarely as soon as in this case. As a rule perfect restoration may be relied on, *if the treatment be persevered in long enough*, for it usually takes a very long time to bring about that desirable result, unless when the child is placed under treatment shortly after the seizure. The following is a good example of the benefits derivable from early recourse to a galvanic treatment:—

Case XXIX.

E. S., æt. eight years, a delicate girl, after a tedious recovery from measles, was found one morning by her nurse unable to move her body from the waist down. The usual medical attendant of the family saw her within two hours of the attack, and she remained under his treatment for about a month. She was brought to me on the 8th April, 1870. I found complete loss of power in both legs; sensation not diminished, but temperature considerably. She had full control over the sphincters of the bladder and rectum, but all power of locomotion was gone. I applied a continuous stream of elec-

tricity from the nape of the neck to the sacrum for five minutes, and repeated it thrice a week for a fortnight; by which time she was enabled to walk with very slight help. The same application once a week for another fortnight completed her cure. As she still suffered from the sequelæ of the measles, I suggested the propriety of giving her syrup of the phosphates with extract of malt for a short time. This was done, and she rapidly regained flesh and strength.

I have no doubt that if this case had been allowed to continue for a length of time without the galvanic stimulus, the difficulty of treatment would have been materially increased.

Case XXX.—*Paralysis of the vocal cords and loss of voice from fright.*

E. G., æt. forty years, a widow, received a severe shock from seeing one of her children fall down stairs. On attempting to speak she found she had lost her voice, to the extent of being able to converse only in a whisper. In spite of all treatment this condition continued for nearly a year, when she consulted me in December, 1870. I found her in good health, but a little nervous. On examination of her throat with the laryngoscope it was evident the muscles connected with the vocal cords were paralysed, as they were very lax and flabby. Faradization of the windpipe externally and of the glottis internally, with small doses of oxide of silver at the same time, were had recourse to, and after ten applications and taking the

medicine for three weeks, the voice was quite restored.

Complete or partial loss of voice is not uncommon, especially in delicate women and hysterical girls; it frequently comes on during and after diseases depending on blood poisons, as syphilis, scarlatina, diphtheria, &c. This latter disease is not uncommonly followed by dysphagia or difficulty of swallowing, of which the following is a good example:—

Case XXXI.—*Paralysis of the muscles of deglutition after diphtheria.*

T. L., æt. forty-two years, a wine merchant, had an attack of diphtheria in the spring of 1867; after his recovery he felt much difficulty in swallowing his food, which frequently came up again when he thought he had overcome the difficulty. Blisters, strychnine, iron, and various nervine tonics were given without any benefit, and he appeared in danger of dying from inanition. Faradization was applied both internally and externally to the muscles of his throat, and syrup of ioduret of zinc given internally, and after a fortnight's treatment the power of swallowing and retaining the food was restored.

CHAPTER XXI.

DIPSOMANIA—ALCOHOLISM.

THERE is no form of nervous exhaustion more severe in its character than that which is induced by the abuse of stimulants. A sudden and violent fit of drinking of course shakes the nervous system very much, and, if frequently repeated, reduces the nervous power materially; but, bad as these effects are, they are slight compared with the profoundly exhausted state of both the cerebro-spinal and sympathetic systems which the continuous use of stimulants in excessive quantities produces.

The effects of chronic alcoholic poisoning are felt not only in the nervous centres, but in most of the important organs of the body, and over the whole mucous tract of the alimentary canal, from its commencement at the lip to its termination in the lower bowel.

The derangements of the digestive organs, of the liver, kidneys, bladder, &c., which usually accompany persistent dram-drinking, vary much in degree, being in a great measure dependent on the particular form of stimulant most frequently indulged in; but the exhaustion of the nervous system is not so variably affected, being pretty much the same whether

the excess is committed with one stimulant or another.

Secret dram-drinking, especially in delicate, nervous women, gives rise to many anomalous nervous symptoms, very difficult to diagnose correctly, as the secresy of the vice itself engenders silence, or wilful misleading on the part of the patient; in justice to whom it may be said, that, as a rule, she is herself ignorant of the close relation existing between her peculiarly nervous and distressing state and the habit she indulges in.

In common fairness to many amiable and refined women of highly nervous temperaments, victims of neuralgia, hysteria, and the like, it must be remarked, that the habit of prescribing brandy, sal-volatile, sulphuric and chloric ether, red spirit of lavender, and other diffusible stimulants, to be used at their friends' or their own discretion, when in suffering, has a most potent effect in inducing the evil habit of over-stimulation, and many a woman who would feel outraged at being called a dram-drinker, is, through this practice, slowly and imperceptibly becoming one without her own cognizance.

The custom which prevails in very large cities, of the head of the family dining in the neighbourhood of his business, while his wife and children have the same meal apart from him, somewhere in the suburbs, offers many inducements to the wife to contract the habit of over-stimulation.

Not having the duty imposed on her of providing a daily dinner for her husband, she is often tempted to have no dinner herself, or some slight

refection, in which wine or beer soon comes to be a principal feature. Dyspeptic symptoms are thus produced, the appetite fails, small quantities of brandy, or some other spirit, are taken to relieve the unpleasant stomach symptoms, the remedy increases the disease, and is flown to more frequently, with still increasing mischief, and, slowly and surely but unwittingly, she drifts into a confirmed dram-drinker. If she is childless, and more or less isolated, the temptations are greater and the descent more rapid.

A small per-centage only of wives so situated fall into this error; still the number is sufficiently great to be notable, and too much circumspection cannot be exercised by young married people in guarding themselves against those errors of diet, which, in women, are most commonly the original cause of intemperate habits.

The mercantile life itself produces drunkards in no small degree amongst highly valuable and highly placed members of its body. Taking what may be termed the upper middle class of the commercial world, certain businesses are more prone to produce dram-drinkers than others. Of these the most usual are the ones in which the principal transactions are conducted out of doors instead of in the counting-house or warehouse. Most important and highly valuable classes of men are engaged, during the whole of their business day, in buying or selling their commodities amongst their connexions in all manner of places, wherever and however they can find them, and in visiting and

taking charge of their country customers at the hotels they frequent on their arrival in town.

I have had professional experience of many a hopeless drunkard, utterly ruined, who has complained bitterly of the necessities of his calling, which entailed on him the duty of waiting on and "showing attention" to the country correspondents of his firm. These correspondents, coming to town once or twice a year for a few days, look upon their visits as holidays, in which excesses may be indulged in with safety once in a way, while to the Londoner the events are of every-day occurrence, and the excesses of to-day with one person or group of persons, must be repeated to-morrow with fresh ones. This, and the habit of completing large transactions on the American principle, "with a drink," have furnished very many most painful cases of incurable alcoholism.

The persistent use of stimulants in excess, after a time presents the following characteristics:—Loss of sleep, which is not relieved by opiates or morphine, disinclination for bodily exertion, with considerable restlessness of mind, a tendency to take offence at trifles, irritability of temper, loss of appetite, foulness of breath, watery and bloodshot eyes, congested mucous lining of mouth and fauces with tumid and relaxed uvula, haggard countenance, uncertain and often shambling gait, tremblings in the limbs, especially the hands, tendency to spectral illusions, extreme sensitiveness to cold, with extremely hot skin, irritable stomach, with severe fits of vomiting, especially in the morning, &c. &c.

In addition to these, pains are felt in the limbs, especially round the joints. All these symptoms may culminate in delirium tremens, or, particularly in women, that condition may not appear.

If consulted by a person thus affected for any ailment, he generally denies that he exceeds, and if asked to state the amount of stimulants taken daily, will purposely mislead, even in the presence of persons whom he knows can contradict him. If questioned much, he is shifty in his answers, will not look you steadily in the face, and is full of plausible theories to account for his symptoms, which theories he often alters for others.

The state of the nervous systems in chronic alcoholic poisoning is one of great molecular derangement. This is due not only to the immense amount of hydrocarbon carried by the blood to the remotest tissues where a nerve filament exists, but to a direct condition of innutrition. From both causes combined the true nerve currents are erratic, deficient, or wanting as the disease progresses. Structural changes also begin to take place, and unless the mischief be averted by prompt and judicious treatment the constitution is utterly ruined, and the case passes out of the bounds of curative medicine to be dependent at the best on palliatives only. Alcohol rapidly destroys the nervous currents when applied directly to a healthy nerve. How much more must it affect the currents in nerves rendered previously unhealthy by a long-continued course of alcoholic saturation.

In treating cases of chronic alcoholism a line

must be drawn between the condition as it exists in the comparatively young and as it may be in the elderly individual. In the former stimulants must be interdicted *at once;* in the latter, owing to the structural changes which must be taking place, and especially to the condition of the circulation, as evidenced by a rigid state of the arteries, stimulants must still be allowed, although in greatly diminished quantities.

In all cases nourishment of the most supporting description, but not beyond the powers of the patient's digestion, must be freely given. A tepid bath every alternate night, at bedtime, will often give the patient a good night; where it fails to do so, and there is much cerebral excitement, full doses of bromide of potassium will have the desired effect, not only in inducing comfortable sleep, but in allaying the excitable condition of the head. Where sleeplessness exists without cerebral excitement, opium and morphine should be avoided and hydrate of chloral given instead.

The Turkish bath has been recommended as a useful adjunct to treatment in these cases, but I have not had sufficient experience of its effects to give an opinion on the subject.

No internal remedy exercises so powerful and beneficial an influence over the broken and exhausted condition of the drunkard as quinine; unless there are special indications present which preclude its employment for a time, it should be given persistently until all the bad symptoms have subsided, and the morbid craving has been entirely

overcome. In many instances the effects of its judicious employment are immediate and most remarkable.

Where practicable the galvanic current should be applied to the whole course of the spinal nerve roots for five minutes on alternate days, and on the intermediate days a mild current for three minutes from the cervical sympathetic to the pit of the stomach (as directly over the solar plexus as possible). If this course be pursued steadily for some time, conjointly with the other treatment laid down, complete restoration may be relied on. It will then depend on moral influences whether or not a relapse may occur at a future time. Mild cases of chronic alcoholism have been treated successfully by galvanism alone; but it requires a treatment based on the combined principles just enumerated to produce a decided and permanent influence on the severer cases of a malady which acts so banefully on so many important organs.

Out of a number of persons who have come under my care for the effects of inebriety I select the two following, as they are good representative cases :—

Case XXXII.

Mr. H. J., æt. thirty-nine years, engaged in a large fur house in the City, had gradually fallen into intemperate habits, and at last suffered from loss of appetite, sleeplessness, nervousness, great mental depression, and the other usual symptoms of chronic inebriation. A peculiar gnawing pain at the pit of

his stomach caused him great distress. The sensation, he said, was indescribable and intolerable, and could only be relieved by brandy, but returned as badly as ever when the effect of the stimulant wore off. He had never had delirium tremens, but was haunted by gloomy thoughts, and during his sleepless nights suffered so much from mental anguish that his existence was a burden to him. He had no suicidal tendencies, but often wished himself dead. On the 13th March, 1871, I placed him under galvanic treatment. As he had no appetite, and his stomach was too irritable to bear quinine, I applied a small blister to the pit of the stomach, and ordered him strong soups and broths. After a few days he was able to take moderate doses of quinine and some solid food. *All stimulants were strictly prohibited.* This was a most severe trial to the patient; but, aided by cheerful and kindly society, he struggled against the morbid craving, and after less than a fortnight's distress overcame the violent desire. His mental depression, nervousness, and want of purpose gave place to a hopeful, cheerful, and more decided turn of mind; his health became gradually better, his rest at night was not disturbed as formerly, and with these changes nearly all his old sensations passed away, and his mind and memory were strengthened. After six weeks' electric treatment he was well enough to do without it, still, however, continuing the quinine and avoiding all stimulants.

A year later I had an opportunity of seeing Mr. H. J.; he had not relapsed into his old habits,

and although somewhat excitable and nervous in his temperament, was otherwise in good health.

Case XXXIII.

Mrs. A. P., æt. twenty-nine years, suffering greatly from severe pain on left side of head. She has been neuralgic since her confinement, which occurred seventeen months since; she nursed her child until its death at eight months, and in consequence of mental distress and exhaustion has taken large quantities of brandy from day to day. She is now rather hysterical, complains of pains in her wrists and ankles, and faints on the slightest occasion. Her mind is depressed and gloomy as a rule, but variable, as she flies into fits of high spirits, to be succeeded by attacks of purposeless crying. The countenance is worn and anxious-looking; she has no appetite, sleeps badly, and candidly confesses that she cannot overcome the use of stimulants, not for the pleasure they give her, but for the relief she feels from her miserable sensations after she has taken them. On the 19th June, 1871, treatment was commenced much as in the previous case, except that no blister was required, and the quinine was at once combined with the galvanism, which was applied to the head for the hemicrania, as well as to the spinal and sympathetic nerves. A highly nourishing diet was given, and a tepid bath every alternate night. Moderate exercise in the open air was also advised, and all stimulants interdicted. A month of this treatment entirely overcame the morbid craving for brandy, the hemicrania was re-

moved, and the other disagreeable symptoms gradually subsided, leaving her in a fair way to be restored to a natural state. As late as the autumn of 1872 I had an opportunity of again seeing this lady; she had continued to improve in health and spirits, and there was no evidence of a return to the old habits.

These cases are very favourable ones, as beyond the stomach symptoms, which quickly yielded to treatment, there was no evidence of organic mischief. In most cases of long continued inebriation serious organic mischief is produced; this materially lessens the chances of complete recovery, but with careful and judicious management, and the moral influence of home and friends, much can be done to overcome the "dipsomania," the morbid craving for stimulants, which after all is the great difficulty which lies in the path of the intemperate individual who honestly wishes to reform. That some morbid action is going on in the brain of such cannot be doubted, and treatment, especially the galvanic, should be specially devoted to that organ. In the cases above cited this was not necessary; the patients were comparatively young, and had a hearty desire to struggle against the temptation.

CHAPTER XXII.

NERVOUS DEAFNESS—TINNITUS AURIUM.

Deafness without any structural change in the conducting mechanism of the ear is a very common affection in persons of nervous temperament, whether hereditary or induced. It is caused by impoverishment of nerve tissue, either in the trunk or minute filaments of the auditory nerve, and may arise from excessive fatigue, long continued exposure, anxiety of mind, excessive loss of blood, over-suckling, severe and protracted illness, or any of the causes which arrest nutrition or exhaust nervous force. It is often found in hysterical patients and in persons who have been subjected to a severe shock or fright, in fact, any exhausting or depressing cause may produce it. In the treatment of this disease great attention must be paid to the general constitutional symptoms, which when urgent must be promptly treated; all the remedies already enumerated as blood and nerve tonics may be selected from, and generous diet with moderate stimulation will be found peculiarly beneficial.

Electricity exercises a most powerful influence over nervous deafness, and conjointly with other treatment may be relied upon to effect complete

restoration of the auditory nerve so long as actual degeneration of its tissue has not taken place.

The particular form of electricity to be employed in this disease is open to discussion. Duchenne and the French school of electro-therapeutists claiming the greatest merit for the interrupted current, by which there is no question cases even of twenty years' duration have been cured;* while on the other hand the German school rely almost entirely on the continuous current.

Altogether the balance of experience lies on the side of the latter, and the cases which I quote here, as well as those which have occurred in my own practice, incline my judgment in the same direction.

Dr. Moss, of Heidelberg, published a case of recovery from nervous hysterical deafness following an attack of acute rheumatism in a young lady, nineteen years old. Before treatment she was completely deaf for noises, musical notes, and speech, and had to be communicated with by writing. The galvanic treatment commenced on the 10th May, 1869, and was continued daily till the 27th July. On the eleventh day of treatment, she heard her own voice in the left ear immediately after the application of the current; on the 24th June she noticed voices for the first time; on the 12th July, two months from commencement of treatment, she could hear the watch on the right side at ten feet, on the left at nine feet; at the end of this month

* *Vide* "De l'Electrisation Localisée," &c. Paris, 1861.

she was sent away for change of air, and the recovery of her hearing was complete on her return, the action originated by the current having continued after its application was withdrawn.

In another case under the same physician—the deafness followed an attack of cerebro-spinal meningitis, and was accompanied by noises in the head, giddiness and headache, the right ear was totally deaf, and the left could not distinguish sounds beyond two feet—twenty-two applications of the continuous current raised the hearing power to eighteen paces, and materially diminished the noises and giddiness.*

Dr. Althaus reports the case of a married lady, aged forty-six, years who had lived much in the Tropics. After an attack of small-pox she was completely deaf in both ears; no lesion could be discovered in the organ of hearing, and the deafness was considered by the many aurists she consulted, to be due to torpor of the auditory nerve. After exhausting all the usual routine treatment, the continuous current was employed, at the end of five weeks she could follow conversation, if loudly spoken to. Treatment was discontinued, as she was obliged to leave town. Six months afterwards she informed Dr. Althaus that the right ear had continued to improve, but the left remained in the same condition as when galvanic treatment was abandoned.

The same physician employed Faradization in

* "Archives of Ophthalmology and Otology," vol. ii. No. I. p. 233.

the case of a married woman of highly nervous temperament, who had been deaf upwards of eleven years. A few applications restored her hearing to a very satisfactory extent; but in this case there had been partial arrest of the catamenia, which became more abundant, and of a better character after the Faradization, and the restoration of so important a function may itself have been sufficient to improve the defective faculty.* Satisfactory cases of the same character as the foregoing may be found in the writings of many eminent electro-therapeutists, as Brenner, Erb, Prussak, Beard, and Rockwell, Hagen, &c. &c.† The following two cases in my own practice illustrate forcibly the effect of the continuous current in nervous deafness :—

Case XXXIV.

S. R., æt. twenty-eight years, a lady of highly nervous temperament, was much broken in health in consequence of great fatigue, incurred during the prolonged illness of a favourite sister. The fatal termination to her sister's ailment had a very powerful effect upon her nervous system generally, and she became totally deaf to articulate sounds; every word spoken to her produced merely a continuous booming, or murmuring noise. Her general condition and the history of the case pointed most forcibly to an exhausted condition of the auditory

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* "Med. Electricity." 2nd edition, p. 540.

† See also "Deafness Successfully Treated by Electrolysis," by H. Campbell, M.D. London: Longmans & Co.

nerves. Great attention was given to her general state, which improved steadily under proper treatment and agreeable change, but the deafness remained unaltered. Early in March, 1870, I commenced a course of galvanic treatment; a current of twenty cells was applied daily till the middle of the following May, by which time the auditory nerves were rendered so far healthy that she could follow conversation, conducted in an ordinary voice, across an ordinary sized drawing-room. She was then sent to the coast, where she remained till the latter part of the year, when she returned to town with her hearing quite restored.

Case XXXV.

F. D., married lady, æt. twenty-nine years, experienced a severe fright from the capsizing of a boat in which she was sailing with her husband off the coast of Yarmouth. Her deafness came on almost at the moment of immersion in the water, and therefore could not be the result of the mere wetting, and it continued long after the other conditions consequent on cold and exposure passed off. Three months after the accident, while still perfectly deaf, she was placed under the influence of the continuous current, fourteen applications of which restored her hearing to its ordinary standard.

Noises in the Head (Tinnitus Aurium).—This most annoying ailment, the actual cause of which is veiled in considerable obscurity, frequently accompanies nervous deafness, although it may exist without it. It usually appears about middle age,

and increases in intensity as life advances, but it may appear at any period of life as a consequence of hæmorrhage, anæmia, hysteria, chlorosis, or any exhausting or depressing disease. The symptoms are not necessarily dependent on exhaustion of the auditory nerve alone; they are often independent of that nerve, and result from pathological changes taking place within the tympanic cavity. Still a great number of cases are strictly nervous in character, the cause of which can be easily accounted for—the close relationship which exists between the nerves supplying the ear and those which are distributed to important and distant organs. The inferior maxillary, the pneumogastric, and sympathetic nerves all send branches through some portion of the ear, so that it is reasonable to suppose that nerve perturbations in other parts of the body supplied by these most important nerves may by sympathy produce considerable derangement in the nervous supply to that organ. The throbbing, beating, and disagreeable fulness frequently felt in the ears after food, wine, violent exertion or excitement, arise from this intimate connexion, particularly that between the pneumogastric and sympathetic nerves whose branches are distributed over all the organs of organic life.

In the treatment of this ailment great attention must be paid to the general health, and if the origin of the malady can be traced to any of the causes first enumerated, our efforts must be directed towards its removal; all the nervine tonics except quinine may be employed with advantage.

This latter has a tendency to aggravate the noises, and for this reason must be avoided.

When the general health is good, and there is no local symptom present in the ear to account for the noises, the rather free exhibition of bromide and iodide of potassium, or of bromide of ammonium alone, will sometimes effect a cure. Small doses of perchloride of mercury in combination with the compound tincture of bark, if taken for a considerable time, from its powerfully alterative effect, rarely fails to relieve the symptoms in the more chronic forms of the complaint. Galvanization of the sympathetic may be tried with advantage in severe and persistent cases; from its effect on the retina, as proved by the experiments of Dr. Hammond and others,* much benefit may be anticipated, as analogous changes may be logically looked for in the ear. If the noises are produced by undue pressure upon the labyrinthine fluid, galvanization, by its power of promoting absorption, may remove this pressure, and consequently arrest the disease. Benedikt speaks highly of the effects of galvanization of the sympathetic in tinnitus aurium, and Beard and Rockwell instance a well-marked case in their practice completely cured by this method of treatment.

The following case occurred in my own practice:

Case XXXVI.

J. L., æt. sixty years, wife of a medical man,

* "Journal of Psychological Medicine," April, 1870, p. 249.

suffered for many years from severe noises in the head. They did not seem specially confined to the ears, but at times were diffused over the top and sides of the head. The confusion produced by them interfered materially with her hearing, for, as she expressed herself, the noises so completely took possession of her, she could not give attention to anything said to her. The attack first came on when in broken health, but still continued although her health was now fairly re-established. The cervical sympathetic was galvanized daily for a fortnight, the positive pole being placed on the lower cervical vertebræ, and negative in the right and left auriculo-maxillary fossæ on alternate days. At first the noises were aggravated during the séance, becoming very loud and hissing, with an occasional sharp bell-like sound; but as treatment progressed these effects wore off gradually, and were not replaced by any other sounds.

The tinnitus has not since returned, and now that the head is clear there appears to be no more dulness of hearing than is consistent with the patient's period of life.

THE END.

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